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ABSTRACT

Eight papers are presented from the 1995 CAUSE conference track on academic computing and Library issues faced by managers of information technology at colleges and universities. The papers include: (1) "Where's the Beef?: Implementation of Discipline-Specific Training on Internet Resources" (Priscilla Hancock and others); (2) "'What I Really Want from the World Wide Web Is....' How Do We Establish Access to Ever Expanding Resources? (Rob Aken and Mary Molinaro), on librarians' role in creating and managing Internet resources; (3) "Library as Perpetual Partner: Providing Information Access and Technology Support" (Benjamin A. Shepherd and others), focusing on developments at Southern Illinois University at Carbondale; (4) "Distributed Academic Technologies: Changing the Face of Teaching, Learning and Research" (Rosemary Ruhig Du Mont and others), on the development of an interactive high performance learning environment at Kent State University; (5) "Computing Center/Library Cooperation in the Development of a Major University Service: Northwestern's Electronic Reserve System" (Brian Nielsen and others); (6) "IT Service for Academic Units: Three Perspectives" (James I. Penrod and others), compares the information technology services provided to departments at three universities; (7) "Teaming Up to Promote Effective Teaching, Learning, and Research Using Technology" (Janet de Vry and others), which discusses joint efforts by four units of the University of Delaware to promote faculty utilization of information technology; and (8) "Library and Computing Merger: Clash of Titans or Golden Opportunity" (Sharon M. West and Steven L. Smith), reports on the merger of the library and computing services at the University of Alaska, Fairbanks. Some papers contain references. (MDM)

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TRACK 8
ACADEMIC COMPUTING AND LIBRARIES

Coordinator: Kären Nagy

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Where's the Beef?: Implementation of Discipline-Specific Training on Internet Resources

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With the recent explosion of Internet information resources, Academic Computing and Library organizations face the dilemmas of who is responsible for Internet services and how to best provide these services. This paper describes how two very different universities solved these problems by having Academic Computing and University Libraries jointly develop a series of discipline-specific seminars on Internet resources.

This paper will cover how the seminar series idea developed; seminar logistics, content and organization; how these seminars differed from previous Internet workshops; the strengths both organizations brought to the efforts; measures of the program success; and differences in the implementations.

With the recent explosion of Internet information resources, Academic Computing and Library organizations face the dilemmas of who is responsible for Internet services and how to best provide these services. This paper describes how two very different universities, Vanderbilt University and Western Michigan University, solved these problems.

At Vanderbilt University, the situation was made even more problematic by the recent split between Academic Computing and the Central Library. While the two units once reported to the same Associate Provost of Information Technologies, they now reported directly to the Provost and each was headed by newly appointed Acting Directors.

The past also had its share of turf issues over who would be responsible for Internet resources and support. There had even been an attempt to teach jointly a few Internet workshops. While these workshops were successful if judged by attendance, they were a failure in that the instructors stopped working together. Instead the instructors divided up the courses and went back to offer them in their respective units. The other problem with these workshops was that faculty did not attend in any significant numbers.

So, Academic Computing and Central Library were faced with the challenge of an ever increasing demand for Internet services, a confusion over whose responsibility it was to provide these services, and a partial solution in place. The Acting Director of Academic Computing approached the Acting Director of the Central Library with the idea of focusing on service rather than turf. Instead of dividing up the Internet responsibilities by organization, it was decided to merge the strengths of the two organizations to provide seamless support.

The Acting Director of Academic Computing offered the Central Library more than just rhetoric. She offered a plan for supporting faculty exploration and development of Internet resources. The plan was to have Academic Computing and Central Library jointly develop a series of discipline-specific seminars on Internet resources. The two organizations would offer faculty seminars demonstrating discipline-specific resources available via the World Wide Web (WWW). The seminars would take advantage of the Central Library's departmental liaison program and Academic Computing's expertise in overcoming technical difficulties.

The Central Library's departmental liaison program provided the fundamental infrastructure for building the seminar series. At Vanderbilt, each Arts and Science department has one faculty member who is designated as the library representative. This person works directly with one librarian who is designated as that department's bibliographer. The departmental bibliographer makes most of the purchasing decisions regarding the departmental material funds. In order for the bibliographer to make good choices, the bibliographer has to know the department well. The bibliographer has a variety of ways to stay abreast of the departmental needs: course schedules, faculty information sheets, individual meetings, guest presentations, and library in-services. For some faculty members, the bibliographer is their "personal" librarian. The end result is that the bibliographer is extremely knowledgeable about the department's interest.

The library representative also plays a key role in the departmental liaison program. The library representative usually does the announcements and public relations for the library in-services. Having a faculty member recommending a seminar series helps boost faculty attendance.

In spite of building upon an existing infrastructure, several factors had to put into place before the seminar series could be offered. Support for the program had to be built across

the campus. As the Acting Director of Academic Computing met with the deans of the various schools, the idea of the seminar series was discussed and support for the program was acquired. Deans had to be reassured that the seminar series would not be used to increase the demand for more computing resources from them.

Support for the seminar series had to be developed not only across campus but within Academic Computing and Central Library as well. Careful consideration was given as to whom would be chosen to lead the seminar series within each organization and to coordinate across organizations. The library consultant was chosen based on her expertise in coordinating with the library's departmental liaisons to deliver successful faculty seminars. The computer center consultant was chosen based on his communication and technical skills.

While support for the program was developing, the details of seminar series were being worked out. It was decided that the department's library liaison would work with the department on scheduling a convenient time for the seminar. Then the library liaison and computer center consultant would work together on the seminar content. The computer center consultant developed a World Wide Web page of key resources for the discipline which would be distributed at seminar. Upon request, computer center personnel were available to help faculty set up their office equipment to access the Internet resources. In order to assess the quality of the seminars, an evaluation form was sent as a three week follow-up.

The program at Vanderbilt has been judged successful as measured by high faculty attendance and favorable evaluations; academic deans praising the program; professional growth of librarians and computer professionals; increased requests for network connections; increased requests for instructional computing support; and renewed respect and cooperation between the organizations.

Faculty attendance at these seminars was unusually high. All but three departments in the College of Arts and Science have participated in the program. Faculty attendance has ranged from 26% to 100% of the department attending the session. Even in the case of the lowest percentage attending (26%), a total of 27 faculty members attended from that department. Seventy-five percent of the people who returned the evaluation form rated the session as helpful to very helpful. People attending the sessions responded that their competency had improved based upon attending. One of the highest compliments for the seminar series was unsolicited and came from the Associate Dean of Arts and Science. He stated that the seminar series was the "best program the Computer Center had ever provided".

The seminars have resulted in increased demand for networking services and instructional computing support. Recent audiences spend less time asking about other Internet services, such as electronic mail and newsgroups, that interested earlier audiences. Instead, recent audiences are asking about how to construct web pages for the department and their courses.

The seminar series encouraged the professional growth of the librarians and the computing professionals. The librarians' use of the Internet in answering reference questions has grown from virtually no use to daily use since the beginning of these seminars. By preparing for these seminars, librarians have learned how to more effectively use the Internet. While the Internet is great for many things, the lack of quality control and source verification often makes it the last place to go for a definitive answer. Therefore, many librarians avoided the Internet. However, since the librarians began giving the Internet seminars, most of the reference librarians have turned to the Internet for answers they could

not obtain elsewhere. A year ago, they would not have known how to do that. It was the training session provided by the Computer Center that provided the skills set and the need to co-teach the faculty members that provided the opportunity to use the newly acquired skills. As subject bibliographers, many of the librarians now use the Internet to read electronic journals, check other libraries' catalogs, and to stay current in the various disciplines. The librarians now provide the Computer Center with complete HTML listings for the department's resource page rather than having the Computer Center representative construct the entire page.

The computer center consultant has grown professional as well. While he continues to be a statistical consultant for the Computer Center, he now serves as Vanderbilt's Webmaster and is well respected on campus for his Internet expertise.

The seminars resulted in renewed respect and cooperation between Academic Computing and Central Library. Holding the seminars in the Central Library's classroom meant that the computer center instructor had to go over to the Library on many occasions. The librarians got to know him and feel comfortable with him. Now many of the librarians view him as their own liaison in the Computer Center. Academic Computing is no longer some vague department, it was at least two faces associated with it.

Given these seminars were so successful, it was important to understand what distinguished them from previously offered Internet training. One key difference was that the seminars were discipline-specific. They were tailored to meet faculty interests. The faculty were not simply shown a tool and left to explore the vastness of the Internet on their own instead they were given access to key resources while being shown the tool. The emphasis was on the content not the tool.

Another difference was in how the seminars were advertised. First they were announced in the Computer Center's newsletter. Then each librarian contacted the library representative to make arrangements for the seminar. Since the seminars were scheduled to accommodate faculty schedules, these seminars were more widely attended by the faculty than any other seminar series. Do not underestimate the power of accommodating a department's schedule. While we had planned initially to offer the seminars as brown bag lunches, we found that each department had its own unique time for meeting. By accommodating those times, we were able to make sure our seminars were well attended.

Distributing copies of the WWW page of discipline-specific resources also contributed to the success of the seminars. This saved the faculty the time and effort required to relocate the resources. The pages were available in Macintosh and PC format to accommodate differences in platforms.

Another way we addressed the challenge of supporting multiple platforms was by being willing to follow up on the seminar. Computing personnel were available to install and demonstrate browsers when requested. From past experience, we knew how easy it was for someone to lose their enthusiasm for a computing tool when faced with the frustration of getting it installed and working. The follow up visits and demonstrations not only saved on faculty frustration but allowed the seminar leaders to use their platform of choice and defer specific platform issues to another time.

The seminars were so successful because of the partnership of the two organizations. These seminars represent the best of both organizations. The seminars capitalized on the strengths of each organization. Central Library contributed its established departmental liaison program, in-depth knowledge of the workings of each department, knowledge of faculty interests, knowledge of content areas for the disciplines, and experience in reference

techniques. Academic Computing contributed technical expertise in Internet services and resources, experience in net surfing, in-depth knowledge of campus network, and experience with regional and national networks. An added value in partnering together is that the seminar developers were able to take advantage of each other's individual strengths. There were several times when the individual strength's were different from the organizational strengths. For example, there were librarians who were well versed in the development of Internet and computer center consultants who had a thorough knowledge of a content area.

Given the enormous success of this seminar series at Vanderbilt University, the question became whether a similar program would work at other universities. Vanderbilt is a Research I (Carneige Foundation rating), medium to large size, and private university. Fortunately, we had the opportunity to introduce a similar program at Western Michigan University. Western Michigan University is a Doctoral I (Carneige Foundation rating), large, and public university. We are in the process of planning the seminar series for Western Michigan University. There are differences and similarities in the implementation of the two series.

First of all, computing support at Western Michigan University is centralized in the office of the University Computing Services which reports to the Provost. Funding for campus academic computing is from a single source in central administration: the Provost's office. These funds are allocated by University Computing Services, unlike Vanderbilt, where the individual deans are responsible for funding computing for their schools and colleges. What this has meant for the discipline-based Internet training at Western Michigan University is that the deans have been uniformly supportive of such training of their faculty, without the concern that occurred at Vanderbilt that such training would create a demand for computing which might exceed the ability of the deans to provide it from their own resources. While access to computing resources is not uniform across the disciplines and departments, the Computing Center and University Libraries can depend upon the deans to support a program of Internet training both to their own faculties and to the Provost. While it may seem basic that deans would support so manifest a "good" as Internet training, in fact their strong support promises to be important in convincing departments that such training is sufficiently valuable that departmental meeting time be devoted to it.

An important similarity that Western Michigan University shared with Vanderbilt is a lack of tradition of joint training between the Computing Center and the University Libraries. University Libraries, which is dependent upon the Computing Center for programming and network support in library automation, has enjoyed a most satisfactory relationship with the Computing Center. However, with the exception of cooperation in the development of a hypermedia presentation used for undergraduate library orientation, the Libraries and Computing Center have had little experience in joint instruction of any kind, much less instruction of the Internet. It was not until November 1993 that staff from the two organizations cooperated in a series of workshops for faculty and those dealt with multimedia and presentation software rather than the Internet. Shortly after arriving in the fall of 1993, the Dean of Libraries proposed joint discipline-specific instructional sessions regarding the Internet and gophering. The departure of the Computing Center's Internet trainer and the impending retirement of the Director of the Computing Center delayed further formal relations until the arrival of the new director of computing.

A second challenge to effective discipline-specific training -- and one shared by most institutions -- has been the uneven level of Internet expertise among librarians. University Libraries has instituted an active and successful liaison program with all the departments. Under this program a librarian is assigned liaison responsibilities, including collection

development and instructional services, to one or more departments. Nearly all library faculty have liaison responsibilities. Each academic department, in turn, assigns liaison responsibilities to a member of the department. As might be expected, interest and level of activity of the liaisons vary greatly, though commitment from the library liaison is uniformly high. As was the case at Vanderbilt, when librarians offered instructional sessions for the faculty at brown bag sessions, attendance was spotty. Based on that experience and the experience of Computing Center staff's faculty development programs, we had no reason to believe that general instructional sessions in the use of the Internet would be significantly more attractive. Indeed, when these general Internet seminars were offered, attendance was low.

That experience suggested that two factors would be important in a successful instructional program for the faculty: securing a captive audience and providing specific information that faculty could use immediately using their existing computers. The Dean of Libraries had already arranged to meet with teaching faculty and their library liaisons at their regularly scheduled departmental meetings. At those meetings library collections and services were discussed and the meeting ended by the dean offering to host a subsequent departmental meeting in the library's electronic classroom. At those subsequent meetings, library liaisons were allocated the first 45 minutes or so of the meeting to instruct the faculty in the use of electronic resources and document delivery systems. While there was insufficient time to introduce Internet resources, the added value which librarians could bring to faculty research and teaching was made emphatic, even for faculty who had previously had little contact with librarians. While a few of the most sophisticated library users were a little bored, most learned something and more than a few learned a significant amount. The important advantage of this captive audience was that the librarians approached the faculty as if they were not skilled users of electronic resources and therefore, those who were, in fact, unskilled did not have to admit it. They did not have to admit a need for help, which few, if any, would have done. At the same session, library liaisons offered to provide private individual instruction at a later time. The success with the captive audience approach also paved the way for subsequent instructional seminars; these will be Internet and WWW discipline-specific.

In an effort to generate interest in the Internet and Web among administrators, librarians and computer center staff presented sessions at regularly scheduled Deans' Council. Again, this was a captive audience, this time consisting of deans, Provost, and associate provosts. A similar session was presented to the vice-presidents. Since most of these administrators did not have a command or even hands on experience with the Web at that time, the impression on them was powerful. Their strong positive response has been important in generating top-down enthusiasm for Internet training in their schools and colleges and, not the least important, for generating across the campus support for making Internet access and training a high institutional priority. The presence of both library and computing center staff at these meeting was important because the questions asked could only have been answered by staff from both organizations.

Key to successful discipline-specific Internet training are the computer center staff's knowledge of computing hardware and networking and librarians' knowledge of the Internet resources. At Western Michigan University, as we began making plans for the seminars, it became clear that a number of library liaisons who were otherwise knowledgeable of electronic resources and skilled instructors were uncomfortable with the prospect of instructing faculty regarding discipline-specific Internet surfing. A number of library faculty began expressing concern that the dean was getting too far in front of the faculty in committing to Internet instruction for specific academic departments.

In early summer 1995, the Dean of Libraries challenged the entire Library faculty, not just the liaisons, to become not simply familiar with the Internet and the Web, but expert in their use, especially in the resources which apply to the disciplines for which they had liaison responsibility. The goal was for them to become expert by the beginning of the Fall semester. In return for that commitment, librarians would receive both in-house training and external training, if they thought it necessary. In addition, they would be provided the release time necessary to acquire the expertise and practice searching and teaching techniques. The library purchased Web manuals for all library faculty. Two experienced Internet trainers from the library faculty provided the basic training and conducted laboratory exercises. Four librarians were funded to attend the Technology in Learning and Teaching workshops at Northwestern University. The dean has recognized those key librarians who have provided Internet training by making Internet instructional efforts the most important criterion in assigning administrative merit pay this year. The Library faculty met the dean's challenge enthusiastically. The result has been the integration of Internet and Web components to library instructional sessions with teaching faculty as time permits and the planning for joint discipline-specific Internet seminars with the computing center staff.

In Fall of 1995, computing center and library staff began planning the seminars with the goal of winter semester presentations. At Western Michigan University, library and computing center staff selected four departments to be the intended audience of the seminars: sociology, education (K-12), business information systems, and art. Those departments were selected because we regarded early success of the seminars to be fundamental to successful university-wide discipline-specific training. Each of the departments have the requisite level of computing and network capacity and library liaisons who are expert and experienced in Internet training. These departments also represent a broad cross section of disciplines. In addition to the roles of computing center and library staff, we expect the faculty members who are liaison to the Computing Center and to the Libraries to play an active role in the planning and implementation of the seminars. It will be important that the departments assume an active role in the seminars and share in the assurance of a positive outcome.

Cooperation between the departments, Computing Center, and Libraries is fundamental to successful discipline-specific Internet training. That is true at Vanderbilt, Western Michigan University, and virtually every other institution. At Western Michigan University, we also believe that this training should be grounded in sound academic principles. Two principles are especially important to our efforts.

The first principle is the belief that just as students find bibliographic instruction much more useful when it is are linked to specific assignments, so too is Internet training more valuable to faculty when it is linked to their specific research and instructional needs. It is through disciplinary-specific rather than general skill-based training that success is most likely to occur.

The second principle is that every student and faculty member deserves equal opportunity to become proficient at utilizing the incredibly rich resources of the Internet -- regardless of their major or discipline. We regard that as a right and not a privilege available to only those whose library and computing center staff are so motivated to provide effective Internet instruction.

We regard those principles to be sound at all institutions of higher education, regardless of size or research and instructional missions. We anticipate that the foundation of successful discipline-specific instruction will be the same at both Vanderbilt and Western Michigan University: professional expertise and commitment from computing center and library staff;

cooperation of both organizations to maximize the expertise wherever it is and to develop it where it is lacking; and support of central administration to the goal of access to the resources of the Internet and delivery of those resources.

"What I Really Want from the World Wide Web Is..." How Do We Establish Access to Ever Expanding Resources?

Rob Aken
Mary Molinaro
University of Kentucky Libraries
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As information providers, we are excited about the potential for delivering information to the desktop of our users in a user-friendly manner. Inevitably, as with any new technology there are many questions to resolve: search engines don't work the same as those in sophisticated databases, we now become "publishers" as well as "guides," everyone must re-tool their skills, we must rethink our realm of responsibility when our students mount their own sites, etc. In Part 1 of this discussion Rob Aken will discuss issues of Internet resources access and the librarian's role in creating, managing, and enhancing that access. In Part 2 Mary Molinaro will address issues involved in providing Internet access to users in a public setting including security, personal web pages, and providing varying levels of consultation. We welcome an open discussion of these issues following our presentation.

Providing Web Access to Library Users

WWW sites can serve both a local clientele and a broad-based user population around the world. Excellent guides to resources abound, but they are often overwhelming to new users or users with very specific needs. Local creation of web sites permits designers to take into consideration the specific needs of their particular user groups (e.g., students and faculty in specific disciplines). Each site therefore can SELECTIVELY point to and mount appropriate resources. Researchers at other institutions who share this interest can then access this specialized data, as well.

Librarians know the idiosyncratic needs of their users and are therefore well suited to compiling this information. A structured selection process is critical to encouraging the continued use of web resources, especially since the growing size of the web makes finding relevant material difficult. Mounting unique local materials and adding pointers to specific related materials contributes a resource that saves students and researchers invaluable searching time, especially given the limitations of current WWW search engines. Most users need the libraries resources primarily at certain critical junctures in their research, and their ability to use a sophisticated, ever-expanding resource will require all the assistance we can provide them, both via well-designed, well-maintained electronic guides and with timely training and consultation. The maintenance of pointers to resource sites is critical in this regard: sporadic users cannot hope to keep up with the changing nature of the web, but dedicated subject specialists (who analyze their subject areas continuously by searching, evaluating, organizing and presenting the material with their specific user group in mind) can and should.

The variety of user needs requires a variety of approaches: some users will take initial training and be off and running. Others will want to consult with librarians often. They may also rely on the library's ability to provide high-end machines and connectivity at a localized site. Still other users will rely on librarians to supply the material they need. End-user searching appears user-friendly to those who use a particular product often enough to get comfortable with it. The growth of the number of sites on the web, now approaching 10 million URL's, increases the need for sophisticated methods of searching, thereby making the use of the resource, even one as easy to use as a web browser, more difficult for periodic and new users. Lycos, for example, plans to add field and code searching, and while on the surface that suggests ease in finding more relevant results, it will often extend the learning curve and not be that useful to users who enter one search term and browse the resulting hits to determine the relevancy level themselves). The one constant, of course, of all users is the need to find information as quickly as possible so they can apply it to their work in progress; what librarians bring to this process is the efficiency that comes with experience with information

resources and the application of appropriate strategies to filter resources so that the most relevant are available.

Various approaches are being considered for making material more easy to find and access. The OCLC Internet Cataloging Project will help libraries provide users with a way to discover Internet materials using a structured, familiar resource (their own online catalogs) access them from the same workstation. This single gateway approach is one of the prime advantages of the web, something users have been seeking ever since electronic resources starting appearing in libraries. Introducing this material into the online catalog is particularly critical at this point in the development of the web because what a user wants is often there, but they don't know how to find it or even think to look there for it.

Librarians are also starting to provide descriptive information and evaluative analysis of tools on the web (see, for example, Roy Tennant's Internet Search Tool Details on the UC Berkeley Library web site http://www.lib.berkeley.edu/Help/searchdetails.html). We can also keep users informed of new resources on a structured, regularized schedule (as we've done for years, for example, with Selective Dissemination of Information searches; Lycos plans to introduce a current awareness service in the near future). And there is a need for evaluating and introducing new search and access tools.

Archiving materials is also necessary; useful collaborations between librarians, computing personnel and information providers are occurring to this end. We should develop electronic repositories encoded for precise access, taking care to designate duplicates and versions, maintaining stable and error-free materials, and establishing authority control for uniform access.

Critical to SCHOLARLY research will be the commitment on the part of resource providers to ascertain the reliability of the material as well as its availability. Librarians must work with technical support personnel as well as the publishing world to guarantee the value of the WWW as a scholarly tool. It is likely access to much of this scholarly material will be fee-based, and libraries will need to work with producers to find distributed cost alternatives that provide access to their constituency. Mirroring of heavily-used sites can contribute to access reliability.

PROVIDING WEB SERVICES IN PUBLIC FACILITIES

With the explosion of the World Wide Web use on campus, click and go browsers such as Netscape present a host of challenges to those providing access in public facilities. While an integration of internet services such as mail and netnews into a single browser is a blessing for a machine on one's desk, in a public facility with open easy access this open access can create havoc.

While Netscape gives the user the ability to post mail and to submit forms to web sites around the internet, the only requirement is that one's mail address be set in the browser's preferences file. The difficulties arise because the user can input any address -- real or fabricated. This unauthenticated mail access is clearly a violation of campus computer security policies and internet regulations, but is extremely difficult to control. System administrators can even go so far as to eliminate mail access from the browsers loaded on all public machines, but there is nothing to prevent users from downloading fresh copies over the internet, configuring the preference files and then sending mail at will.

World Wide Web services have become so accessible that users are now easily able to publish their own information on the Web. Since it is so easy for users to create their own web pages it is natural that they want them to be attached to a web server for public consumption. The more savvy computer users can create their own servers within their accounts while the less able pressure the local system administrators for public space for their work. Several questions arise from these scenarios. Do system administrators spend time hunting down and eliminating unauthorized web servers or is it better to provide space for users to publish on the web? If administrators provide the facility for users to mount web site is the university responsible for content? The material is after all gaining access on university owned and operated equipment.

As technology is better integrated into the classroom and the World Wide Web is being used more as an instructional tool, who is charged with maintaining the sites that are created? Since the sites are world readable and these sites project a certain image of the university is the university responsible for monitoring the content, for safeguarding the accuracy of the information or the "look and feel" of the information?

Providing good service to users becomes increasingly difficult as applications become more diverse and more powerful. There are so many different web browsers with a such a variety of functions that providing service and support for each one are difficult. Users can use browsers with a graphical user interface or one that is text-based; a browser that supports forms or one that does not; a browser that functions one way today and another version that functions differently tomorrow. The computing environment is

changing so rapidly that providing consistent support is nearly impossible to accomplish successfully.

Accessing user needs and abilities is also difficult. New users and experienced users will have varying levels of needed assistance. Consultants in public facilities must be able to assess users' abilities and needs to answer their questions appropriately.

Many faculty members are now requiring students to use internet services to find information and to submit assignments electronically. It is not uncommon for faculty to assume either that students already have the internet skills needed to complete the assignments or that the consultants in the public labs will provide the needed instruction.

The new technologies are allowing us to teach in ways never imaginable two decades ago. Students are now better able to communicate with the faculty and with each other. Collaborative projects are now possible using various software packages or the World Wide Web. While providing service and support in a rapidly changing environment to a clientele with ever expanding expectations is challenging, the overall benefits to the educational process make it worth the effort. Instructional technology is providing the foundation for an information literate student body that will be better able to compete in tomorrow's society.

LIBRARY AS PERPETUAL PARTNER: PROVIDING INFORMATION ACCESS AND TECHNOLOGY SUPPORT

Benjamin A. Shepherd, Vice Chancellor for Academic Affairs and Provost

Carolyn A. Snyder, Dean of Library Affairs

Jay Starratt, Director of Technical and Automation Services

Southern Illinois University at Carbondale

Carbondale

Illinois

The library as a perpetual partner in providing services and technology for Academic Affairs is described by the Vice Chancellor for Academic Affairs, the Dean of Library Affairs and the Library Director of Technical and Automation Services. The collaboration includes campus partnerships in Academic Affairs and with other areas of the university such as Information Technology. State, regional and national cooperative endeavors in which the University is engaged to meet the service mission of the library will be discussed. A videotape which provides an overview of some of the partnerships is part of the presentation, and copies are available upon request.

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Vice Chancellor for Academic Affairs and Provost

My colleagues and I appreciate the opportunity to share with you some of our accomplishments and how they have been achieved, in the areas of technology support and, providing access to information. Excellence in these areas is necessary to sustain and enhance Southern Illinois University at Carbondale's (SIUC) mission of teaching, research and service.

As is surely the case with each of you, we are finding that information access, which comprehends technology support, is a principal limiting factor on our ability to remain competitive, as well as to meet the needs of our faculty and student user populations.

The limiting factor on information access of course, is "scarce resources." We have calculated that to meet our technology "wish-list" needs, SIUC would have to win the Illinois lottery when the lottery reaches the $140 million mark. This mind-boggling number is an estimate of what would be required to: connect all of our buildings with fiber optics; renovate and install wiring closets; and purchase the necessary hardware and software to complete our transition from a mainframe environment to a distributed, client-server model.

As a state-supported institution, the Illinois Purchasing Act does not allow us to either budget for or purchase lottery tickets; hence, we are having to find other means to incrementally fund a much-scaled down list of highest priorities. I am finding that even the process of identifying the highest of the high priorities is a challenge, and the increasing demands for an ever-growing list of services by the user populations combine to form a chorus that may be likened to the Preservation Hall Jazz Band playing counter-point!

To give you some perspective of our University, SIUC is a Carnegie II Research Campus with approximately 23 thousand students and 900 full-time faculty. We have nine undergraduate colleges, a School of Law, a School of Medicine and a Graduate School. At the center of these instructional and research units is the library, which holds memberships in the Association of Research Libraries and the Center for Research Libraries. In addition to meeting the undergraduate instructional needs, the library serves the graduate education and research needs of 57 masters programs and 27 doctoral programs. Our external grant and contract activity is roughly $65 million; $20 million of which is from federal sources, largely to support research.

Approximately 80% of the state appropriated budget for the Campus is allocated to Academic Affairs. Structurally, the

instructional and research units except for the School of Medicine report to the Academic Vice Chancellor, as well as do the Library, Admissions and Records, and the Broadcasting Services. A separately budgeted administrative unit titled Information Resources reports to an Executive Director for Information Resources outside of Academic Affairs. Information Resources is responsible for telephone services, central administrative computing, and the basic technology infrastructure needs of the Campus and includes Information Technology which interfaces with the library. From my view as Vice Chancellor for Academic Affairs, Information Technology is a high potential ally and partner for Academic Affairs, and the library in particular, to join forces to meet the information needs of the instructional and research user populations.

In order for this potential to be realized, cooperation and open communication had to be the rule, partnerships had to be forged, and strategies developed. The federation of players included the Executive Director of Information Resources, an informed Library Dean with a vision, and the Vice Chancellor for Academic Affairs. The Dean of the Library was fortunate to have a first-rate staff, and it has been my good fortune to have maintained open communication and cooperation with the Executive Director of Information Resources. As a result, we have been able to engage a partnership between the library and Information Technology which leverages scarce resources to better meet user information needs. Other benefits of the partnership have included: 1) decreasing cost; 2) taking advantage of complementary expertise within Library Affairs and Information Technology to increase the scope of services delivered; and 3) collectively identifying priorities which have the highest return on investment.

At the core of the Library/Information Technology partnership is a functional team of professionals from both units, which supports the Campus Wide Information System. This CIRCA 2001 Team is the glue which holds the partnership together, and which has contributed greatly to the expansion of information services and technology support to users in a resource-limited environment. I should hasten to add that neither the CIRCA 2001 Team nor the cooperation between units has diminished the challenge to the library for increased services, and additional products and applications. Balancing the resources to meet user needs across the faculty and student populations falls on the shoulders of the Dean of Library Affairs.

Our instructional program mix and strategic geographical location in the state of Illinois have had an impact on our technology initiatives. Our service area is the southern one-third of the state, and the Illinois Board of Higher Education which is the higher education coordinating board

has charged SIUC with giving leadership to the statewide, telecommunication network for downstate Illinois. This places us at the center of two regional consortia, Southwest Illinois Higher Education Consortium and the Southern Illinois Collegiate Common Market each headed by a Director, who works closely with the nine respective Community College Presidents, the two University Chancellors and the SIUC Library Dean in particular. Together, we partner to provide a between-and-within telecommunications network and technology infrastructure on the Campuses to meet the growing Distance Learning needs of the region. The library serves as the macro-interface between our Information Resources and the consortia members, and participates in scheduling and maintenance of the supporting technology infrastructure.

SIUC is committed to fully exploiting the incorporation of technology into the instructional process, to improve teaching and learning. Evidence continues to mount which suggests that creative infusion of technology into the delivery of content to students, at least in some disciplines, results in superior achievement by the students when compared with traditional pedagogical methods. Mastery of content in Mathematics and Computer Science by students in Arizona and Oregon strongly suggests that by using technology to supplement delivery of the material, student performance is increased and cost is decreased. I am not advocating that the so-called "talking heads" can or will be replaced by technology; rather, I am acknowledging that compelling cases are surfacing which demonstrate that the infusion of technology into teaching and learning, can enhance student comprehension, and increase pass rates and student retention. The litmus test for the effectiveness of technology in the delivery of content has to be student comprehension. Cost is also an important parameter but is secondary. At SIUC, our first concern is to improve the quality of the undergraduate instructional enterprise campus-wide through the use of technology as a supplemental teaching tool. We believe that technology has the potential to not only enhance comprehension of focused content, it can also allow the learner to build on the content by accessing a virtual knowledge base independent of the instructor.

The greatest on-going investment of resources on the Campus is in personnel, and the faculty is the knowledge disseminating and generating machine which drives teaching and research. This means that faculty expertise must be matched with the power and capability which technology may afford if the Campus is to take maximum advantage of both resources. Many of our faculty are not trained in the use of technology to improve their productivity in the classroom and laboratory, and others are dubious that the use of technology can make a positive difference. This inertia must be overcome, and the library is a central, potential

change agent to recruit, train, and provide continuing support to faculty, as they make use of technology to increase productivity, as well as increase quality.

Last March, our Campus was selected as one of 52 new media centers nationwide. The cost benefits realized from this designation will allow the Campus to accelerate development of multimedia products and incorporate them into the instructional process. Our multimedia initiative to be successful must be program driven, and to ensure that the program drives technology rather than vice versa, we are seeking an M.A. degree in Multimedia. This degree program will be structurally located in our College of Mass Communication and Media Arts which already houses degree programs in Radio and Television and our Broadcasting Services composed of two TV stations and two radio stations. However, the partners charged with making the multimedia effort a success include the Library, the College of Mass Communication and Media Arts, and the College of Liberal Arts. This three-way partnership is in every way complementary, leveraging existing investments in personnel and in technology to launch an on-going degree program which will produce quality graduates, train faculty in the use of technology, and research, develop and assess multimedia instructional products which can be used to enhance the quality of instruction on Campus, as well as produce quality, Distance Learning course formats.

As you can see, we have devoted considerable effort to forging on-campus partnerships which we believe will increase productivity and cut costs. We see the library as a critical player in our efforts to accelerate the effective incorporation of technology into the teaching and learning process, without compromising its traditional roles as information access provider and instructional support partner.

Dean Carolyn Snyder will now share with you the Dean's perspective on how well we are meeting our challenges.

Dean of Library Affairs

My comments will focus on the library's role and goals as a perpetual partner on campus in both the state and the region. The academic technology leadership position that the library holds on campus was established and encouraged by Provost Shepherd and the Chancellor when I was appointed at Southern Illinois University at Carbondale (SIUC) four years ago. The library plays a key role in projects that bring together individuals from units such as Information Technology, Broadcasting Services, the colleges and the regional higher education consortia.

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Library Affairs is a unit of Academic Affairs. As the Dean, of Library Affairs, I report directly to Provost Shepherd and am a member of Deans' Council. All of our library activities are based on our mission: "to support the current and anticipated instructional, research, and service needs of Southern Illinois University at Carbondale. Library Affairs will strive to serve the citizens of the state and scholars of the nation and world. Library Affairs will assume a leadership role in providing intellectual, bibliographic, instructional, and physical access to information resources. Service to users is the first priority of the library." To reiterate, the library is a service organization for our faculty, students, staff and other users. The SIUC library has broader campus technology responsibilities than some of the other major research libraries. In addition to the usual range of library and information services, the SIUC library has responsibility for:

1. Distance Learning coordination and Distance Learning technical, network, and instructional support. (Distance Learning is defined as the utilization of interactive video to deliver courses.)
2. Other Instructional Support Services including instructional development, instructional evaluation, video production, multimedia and other instructional technology, and classroom equipment support.
3. The Ulysses S. Grant Association, an editorial project.

In the context of the campus environment described by Provost Shepherd, relevant operational objectives of Library Affairs include:

1. Providing high quality services and maintaining efficient and effective operations.
2. Increasing and enhancing services to users.
3. Increasing library and information resources and services available to locations outside the library, including offices and homes.
4. Accomplishing this in an environment of serious staffing and budget limitations (even though the library has received special consideration for the limited funding available).
5. Reviewing on an ongoing basis resource allocations and appropriate reallocations to meet the highest priorities.
6. Providing ongoing programs of education and training for library users and library staff.
7. Broad sharing of information among library staff in all types of appointments. For example, a graduate assistant may be the expert for a particular software application.

The assets of Library Affairs include:

1. University administrative support and understanding of our challenges.

2. Excellent, creative and dedicated library faculty and staff.
3. A library leadership team which is committed to plan and implement new technologies and services for our users. This team is willing to change, to learn, to take some risks and is enthusiastic about technology.
4. A tradition of partnerships and networks, such as our leadership in resource sharing/interlibrary loan in the state, the region and the nation.

However, even with these assets, we have been challenged by the range and diversity of opportunities for providing excellent services and resources to the entire academic community. Therefore our new and evolving partnerships are essential to meet our service goals.

The most basic and long-standing partnership of this library and most research libraries is with the faculty and students of the campus. The faculty and staff of the SIUC library have a broad understanding of the teaching, research and service activities of the university because of their long history of collaboration with the faculty to build the library collections and because of their provision of library services. This partnership was strengthened two years ago with the implementation of the library's Liaison Program, the assignment of a library faculty member to work with each of the some sixty academic departments on campus to meet their library and information resource and service needs.

In the last four years, the library has also formed other strong and special partnerships to meet the needs of our users. With limited staffing and fiscal resources, this collaboration and sharing of staff resources has been essential. Our partnerships, which I will describe only briefly because they are illustrated in the video, include:

1. CIRCA/2001 Team: A partnership with Information Technology which was established in 1992 to establish, maintain, and expand the CWIS, Campus-Wide Information System.
2. Campus CIRCA/2001 Group: A user group led by Library Affairs and Information Technology which includes representatives from many academic and support areas. It meets once a month for information sharing and demonstrations.
3. Geographic Information Systems (GIS): A group of campus users who formally and informally share information and resources.
4. Instructional Support Services: A wide range of projects in instructional development, video production, multimedia and other instructional technology developments involving many partnerships with individual faculty members and others involved in the instructional process.

5. Distance Learning: Multiple partnerships on campus and in the region.
6. Digital Imaging Unit: A number of collaborative activities including the University Press/University Library projects begun as one of the original Coalition for Networked Information/American Association of University Presses projects.
7. Athletics: The fifth year of partnerships with both the men's basketball team and the Student Recreation Center in publicizing our joint activities through fund raising events.

We have available an eleven minute videotape produced totally within the library. This videotape, produced to update the campus about Library Affairs, describes and illustrates some of our technology partnerships. Our colleague, Jay Starratt, had primary responsibility for writing the script and overseeing the production. Copies of "The Library And Technology Partnerships" are available for loan from Carolyn Snyder.

Director of Technical and Automation Services

My part of this presentation is to describe the benefits and challenges associated with working in these numerous and varied partnerships, and to explain what the day to day enterprise entails.

I should first say that the benefits of working together far outweigh any drawbacks. For every instance of small annoyance and frustration, there are scores of moments where there is a sense of real accomplishment and urgent enthusiasm.

Without a doubt the primary benefit of our cooperative efforts is improved campus-wide communication about technology initiatives. I cannot overestimate the value of the fact that through various formal and informal alliances formed over the past few years, across the campus, people working on aspects of information on instructional technology have gotten to know each other. Such familiarity breeds respect.

It is valuable for the people in the colleges to know what the library and the Information Technology staff are doing. It is equally vital that they have an opportunity to help us in our developments and for us to know what their priorities are. When people are informed, they are usually supportive.

This sharing of information moves easily into sharing of expertise. With quick and easy communication, what one person learns, we all become aware of or can learn without the struggle of being the first to learn. Indeed in many

cases, the first to learn becomes everyone's resident resource, no matter where they actually reside.

Sometimes, sharing of staff expertise can lead to sharing costs, as when the Geography Department helps support a graduate assistant in the library's Geographic Information Systems (GIS) unit.

Again, sharing of expertise moves easily into sharing services, facilities and equipment. Not every one has to own every thing if they are fairly confident that they can avail themselves of a service or piece of equipment easily and without hassle. The proof of this benefit is that a number of colleges have helped the library purchase equipment or software, but let it reside in the library. We all can stretch our funds that way.

As this illustration shows, the partnerships build trust. We give each other the benefit of the doubt and we don't look too deeply for camouflaged agendas. As the technology experts in a college come to trust us, so do the others in the college.

Perhaps the greatest benefit is that of the simple awareness for the library and for the Information Technology staff of the conditions throughout the university. Sometimes we get used to rarefied atmosphere where everyone is well equipped and well trained. Our conversations with our colleagues can bring us back to earth.

The challenges of our partnerships are the same as with any groups working together, but I have to say that our conflicts are minimal because of the enthusiasm we all share for the work.

Our biggest challenge lies in the fact that the library staff is at the crossroads of everyone's highest priority project. It is occasionally difficult to have everyone keep an appropriate perspective on their key projects. Needless to say, these partnerships not only allow for better communication, they demand it.

The coordination of all the people and projects can be a challenge when the people are working in different units. It is especially difficult among a group notoriously disdainful of meetings, most notable about general meetings. The Head of the CWIS Team and I get a lot of good natured abuse when we call big meetings for the purpose of information sharing. We have many "Dilbert" fans in our groups. But if we rely too much on the informal, we drift apart and surprises start to pop up.

Ongoing support for the projects we help our partners develop is another challenge for which we don't have a

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miracle cure - development is just more fun. Fortunately, the various campus units are adding technical staff at a steady rate.

This expansion of staff has also meant that we must pay closer attention to protocol. It may surprise you to know that there are some people who act without the authorization of their units. We must always be careful not to overstep our bounds and trod on someone's toes, while still maintaining an approachable front.

It is a challenge to keep all the balls in the air; to keep every one committed and enthused; to keep everyone in the same book, if not on the same page, but it is well worth it, especially for our users.

The last thing I am supposed to talk about are future initiatives. To be honest, I had hoped I would be able to say "but since our time is almost up and we need to have a period for questions, I will just stop here and open up the floor to questions," because I have developed a legendary status about being wrong about predicting future initiatives. I only know that future initiatives will come from out of left field and will overwhelm us with their urgencies.

(January 4, 1996, CAS)

Distributed Academic Technologies: Changing the Face of Teaching, Learning and Research

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Kent State University, an eight campus system serving nearly 32,000 students, is engaged in a strategic planning process in collaboration with the IBM Corporation, to define and implement technological initiatives that facilitate the development of an interactive high performance learning environment -- an environment that is more learner-centered with self-paced instructional multimedia courses that can be distributed to students anytime and anyplace. The objective of this paper is to share the rationale, goals, objectives, benefits and critical success initiatives developed during the planning process. The paper will also address the pilot distributed learning projects that are currently underway, as well as the vendor partnerships being established to support the distributed learning effort.

RATIONALE

The spectacular proliferation and integration of computers and networks have fueled the creation of a global information environment -- an environment that allows people to share information and collaborate on projects from any place on the globe. This "information age" is touching every aspect of our lives, especially the ways in which we teach and learn. It promises to extend the boundaries of education beyond the walls of institutions into the community and beyond -- into schools, homes, businesses, etc.

Kent State University, like most universities, is facing an enormous challenge -- how to acquire and integrate the technologies of the information age, and develop the interactive high-performance learning environment that will take it into the next century. The "learner-centered" environment that Kent is creating focuses on integrating distance education and multimedia technologies, and includes self-paced instructional multimedia courses capable of being delivered "just-in-time" to students anytime and anyplace.

This paper reviews some of the key issues associated with Kent's progress in meeting the challenge mentioned above and describes the goals, objectives, benefits/impact, and implementation approach being taken to move into a high performance learning environment.

GOALS

Persistent technological change along with budgetary constraints create major challenges for Kent State University to meet the technological needs of its academic sector. The Kent Self-Study Report for North-Central Accreditation notes that the university continues to allocate an ever-greater proportion of its resources to computing in an effort to improve its networking, instructional delivery and information systems. Kent is in the process of constructing a Kent Campus fiber-optic network, as well as links to each of its seven regional campuses. Kent's Strategic Plan states that the University should continue to "enhance access, teaching, and learning by utilizing state-of-the-art instructional and communication technologies." The efforts to enhance Kent's technological infrastructure support its desire to strengthen support for technological initiatives throughout the university system as well as to expand access to information sources, educational opportunities and communication networks for all students and faculty without regard to time or place.

The following specific goals for Kent include:

* growth of discipline-specific hardware and software adequate to support student and faculty educational endeavors;
* standardization of general computer applications such as word processing, spreadsheets, and database management;
* consistent access to well-equipped and staffed computer labs;
* support of electronic or multimedia classrooms that house a selected set of technologies that enhance instructional capabilities through a

variety of methodologies and resources;

* requirements and opportunities for students, staff and faculty to achieve technological competency;

* student and faculty access to library and other information resources, including text and graphics, whether they are located on a specific campus, across the nation, or around the world;

* real time conferencing involving multiple users such as faculty and students, interacting at an informal conversational level;

* collaborative research projects and routine group work by teams through the use of common tools such as spreadsheets, graphic representations, tables and mathematical equations;

* the integration of administrative data into the instructional process, thus contributing to faculty and staff effectiveness through improved timely access to needed information for purposes such as student advising;

* the study of information flow and re-engineering of work processes to reduce manual procedures and paper flow is needed.

Three specific actions relate to the above goals: 1)Kent is systematically developing multimedia, distance and distributed learning courses to be initially disseminated using high speed network connections among Kent's eight campuses. Three courses are being developed in phase one of an ongoing effort to create and offer multimedia courses and workshops distributed over computer networks throughout the Kent State University system, as well as to corporate sites in the region. A team approach to course building includes faculty participants as well as library, media and computer services staff working with corporate and other university partners. 2) Kent is in the process of establishing a technologies and learning center with facilities and programs to support a broad range of teaching and learning systems that serve faculty and students and community members who have differing technological capabilities, learning styles and needs. 3) Research on the effective and efficient use of integrated distance learning and multimedia technologies by faculty and students in multiple, teaching, learning and research environments is being emphasized through written documentation of project development and evaluation of the multimedia/distributed learning courses currently under development.

KEY OBJECTIVES

Kent recognizes that a University wide network is a required utility (like water or heat) for the survival of a modern university. The network has to be ubiquitous, reliable and provide adequate capacity to support voice, data and interactive video communications. The existing network plan, completed in September 1992, provides the University with a realistic blueprint for a campus wide backbone. In order to provide for interactive video, the plan includes the installation of single-mode fiber to support the establishment of fully mediated classrooms and distributed learning programs. By the spring of 1996, the backbone will be complete.

In addition, a technologies and learning center is being developed on the

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Kent campus to serve all eight Kent State University campuses. Moulton Hall, built in 1917 and listed with the National Register of Historic Place, will undergo a physical transformation to serve as the hub of technology initiatives for the University. This hub, to open in the fall of 1997, will:

* create an environment in which faculty can research, design and test how technologies can bring about more effective teaching and learning in both face-to-face and over great distances.

* offer technologies and new techniques to a broader constituency and train that constituency in their use.

* act as an information distribution and management center and a resource center for the educational community.

* facilitate work with other universities and corporate partners to develop and disseminate "learner-centered" courses utilizing today's new technologies.

* support the establishment of a variety of technology-rich "mock" classrooms.

* provide classroom observation facilities to support and enhance research.

* include an academic technologies software library and laptop computer loan center.

* provide a presentation and conference facility designed for teleconferencing.

* create direct linkages to Ohio's 100,000 K-12 classrooms through Ohio's SchoolNet initiative and to business and community organizations.

BENEFITS/IMPACT

The impact of the multimedia distributed learning initiatives being put into place will be on people, the places where they will earn, and the learning strategies they will use through the use of technology.

For students, multimedia distributed learning initiatives will provide a comprehensive approach to disciplines that are not time or place bound. It will link students with teachers, resources and other student across campuses as well as across the world; an all-encompassing view of disciplines using all appropriate media; a versatile technological platform for the classroom, from which professors can draw to make sophisticated observations of their own, thereby sharing their own expertise more effectively with students; an easy-to use "second home" available 24 hours

a day, 365 days of the year in dorms, at home, in other classroom buildings, in a format that allows students to move at their own pace, regardless of their educational backgrounds; connections for global teams of students who can learn and do research together; a computerized record of the student's intellectual odyssey.

For faculty, multimedia/distributed learning initiatives will provide the impetus for restructured courses, curriculums and teaching methods that take advantage of multimedia technologies; shared research, instructional activities and equipment with the multiple campuses of Kent State University and other universities, by removing the boundaries of time and space; new interdisciplinary research and teaching connections between universities through the use of electronically networked resources; a new research agenda related to qualitative and quantitative improvements in education through the use of information and multimedia technology; new partnerships with industry, government and primary and secondary schools through the use of the information infrastructure; and consulting opportunities in the area of technology and multimedia applications.

For the community, multimedia/distributed learning offerings will enhance the easy and regular flow of communication and ideas, that have the capacity to bring Kent and its communities closer together; apply expert knowledge originating at Kent to community problems or objectives through the use of technology; provide greater opportunity for collaboration between the university and its surrounding communities.

IMPLEMENTATION APPROACH

Solutions to the technological challenges facing the University lie in the ability of the University community to articulate clearly the options and resource requirements for multimedia/distributed learning initiatives. The logical assignment of responsibilities for meeting needs and the establishment of a well-defined balance of effort between central and distributed information systems and services is now being determined and implemented. Much work will be required before the next century to meet the particular information technology needs of each discipline. This will necessitate a major realignment of allocations across all sectors of the University to achieve noticeable progress and positive change in instructional processes.

A faculty advisory committee to participate in the development of program requirements for an academic technologies and learning center (Moulton Hall), was established in 1994. This was followed by the development of four "cross functional" teams made up of faculty and staff, to determine the direction of all multimedia/distributed learning initiatives at the University. These teams advise in the areas of 1)technology infrastructure and networking; 2) faculty and student support; 3) policy; and 4) grants and funding. All teams have been meeting regularly since May of 1995 to help articulate the vision for transforming education through the use of technology, as well as further defining program requirements in real terms, i.e. policies needed to support multimedia/distributed learning options;

equipment and training needed by faculty, staff and students to work in this new environment; the technological infrastructure needed to distribute courses over computer networks; as well as the funds needed to carry various projects forward as well as sources of support. Over 60 faculty and staff from all campuses of the University are involved in the deliberations of these committees.

In addition, Kent's multimedia/distributed learning initiatives are presenting a unique opportunity for the University to establish mutually beneficial partnerships with individuals, other educational institutions, private corporations, governmental agencies and others. By pooling resources and working as teams, partners are participating in developing asynchronous models of instruction that use the national information infrastructure, and interactive multimedia and distributed learning technologies. This collaborative effort is providing a model of joint planning and implementation between public and private organizations that would be difficult, if not impossible, to accomplish independently.

Partners are having the option to support a series of distributed learning pilot projects; helping to determine the best solutions for implementing Kent's eight-campus technological infrastructure; advancing specific educational and commercial agendas; or most important, helping to create the Moulton Hall Technologies and Learning Center.

All of these efforts are leading to the development of an action and project assessment plan to include the following critical success factors:vision and leadership; program definition, consensus and support, funding, training and support, quality management, visibility and public relations, facilities and policy review. Documentation of these factors is an ongoing part of the pilot project now under way.

PILOT PROJECT

Pilot 1, being completed in partnership with the IBM Corporation, is part of the Moulton Hall Technologies and Learning Center effort. It is the first of four such pilot efforts intended to build courses and workshops that will be able to take advantage of the capabilities of Moulton Hall from its initial availability. It is comprised of three separate courses which are being built to be delivered in a PC based distributed interactive multimedia environment. Pilot 1 includes development of three courses: a senior level course in Nursing, a junior level course in English and a graduate level course in Business Administration. A major benefit of the Pilot approach is the opportunity to determine problems in a controllable environment. It is also providing the opportunity to determine the true parameters of the enterprise and to make adjustments and changes as needed, from technical, logistical and policy points of view before a large number of courses are distributed over a wide area. It is helping faculty to understand what is involved in working in this new environment and promoting faculty buy-in for the distributed learning effort.

Goals of Pilot 1 include: increasing student access to education without regard for time and place; increasing teaching tools available to faculty by validating the multimedia/distributed learning model. Objectives following from these goals include: evaluating the effectiveness of the distributed learning medium and determining what works best for both faculty and students; determining a workable course development process for Kent; integrating new uses of digital technology in the classroom environment; building digital PC based interactive multimedia courses for distribution among Kent's eight campuses; and determining a viable technical architectures to support multimedia/distributed learning courses.

Pilot 1 courses are being developed by teams of faculty and technical support staff who are "building" courses, with the aid of staff skilled in graphic design, film production and information technology systems. Formal documentation of the process underway is providing a summary or problems and issues, both technical and policy, as well as a record of how each is resolved. Documentation of repeatable processes is also underway.

Major steps in pilot course development include the following: initial course design, supported by syllabus development; training in the use of multimedia development software for both faculty and staff; facilitated story board sessions to "draw" screen images and determine appropriate multimedia content; development of new multimedia content as needed (custom video, audio, animation, graphics, photos); module (course unit) construction; testing (student "try-out" of modules); revision based on student feedback; testing of technical environment; and evaluation of teaching/learning effectiveness. The first two courses are scheduled to be offered in the spring of 1996; the third course is scheduled for the fall of 1996.

Four pilot cycles are planned before the opening of Moulton Hall; the building is scheduled for opening in the fall of 1997. Each cycle will test the use of technology, software and design applications, and establish a level of expertise by the support staff which can be carried over into courses developed within the Moulton Hall environment.

BENEFITS

There are several overarching benefits to the University that are likely to come from supporting multimedia/distributed learning initiatives. They include: improved motivation, retention, and satisfaction of students; students who are better prepared for their careers; graduates who are more competitive in the marketplace; students who are better prepared to live and work in the computer and information age; an improved placement record for University graduates; improved instructional techniques based on multimedia/distributed learning models; enhanced student, faculty and staff productivity; improved faculty research competitiveness; and an improved image for the University.

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In addition, the establishment of Moulton Hall as a center for multimedia and distributed learning technology will support an increase in the quality and efficiency of instruction. Students will receive more hands-on instruction, resulting in an improved learning experience. When students see computers and related technology used effectively, they can develop better models for their own computer use. Computers will also be more widely used in a variety of classroom settings. Faculty will also be in a better position to use multimedia technologies to enhance the learning process. They will have added incentives to invest their time in innovative approaches to computer-based teaching. In addition, they will face fewer difficulties and have staff and technical support for their attempts to use new technologies for teaching.

Distributed learning initiatives will make it possible for students to participate in classes offered at any of Kent's eight campuses without regard to their campus of residence. They will be able to work together and with teams of students from institutions other than Kent without having to come together in the same physical space. Northeastern Ohio will have immediate off-campus access to the technological and educational expertise of Kent faculty. Corporate executives will be able to collaborate with Kent faculty in teaching employees at remote sites. Business and community members will have both on-site and remote access to distributed education and training programs and be able to test new software, and receive training on new technological applications. School districts and classrooms, through Ohio's SchoolNet program and from around the world, will have access to interactive distributed education and training programs.

CONCLUSION

Multimedia/distributed learning technologies are not the proper mode for all faculty or all students. Faculty must feel comfortable with the technology, must genuinely enjoy spirited interaction in a distributed mode and "expect the unexpected" to happen, both with the technology itself and with students as they learn in this environment. In addition, though there is the expectation that students will like this medium of learning better than that of traditional courses, some may drop out or may dislike it very strongly.

Multimedia/distributed learning technologies support additional methodologies for teaching and learning, not substitutions for those that currently exist. As a force for enriching the teaching/learning environment, multimedia/distributed learning technologies offer a set of tools, strengths and limitations which are available to an instructor for delivering course materials and structuring learning experiences. Kent is currently focusing on the strategic use of such technologies to address critical issues in instruction and education. It is currently demonstrating how existing multimedia development tools can be enhanced to support the creation of multimedia courseware in a distributed mode and in so doing create more learner-centered applications. The move to Moulton Hall will allow Kent to broaden its focus to explore new models of distributed

learning and the use of instructional and technological systems which enable them. Kent's ability to define new teaching and learning models based on technology is strategically tied to an understanding and deployment of distributed technologies and learning environments created in the pilot project process.

This paper has summarized the rationale, goals, objectives, benefits and critical success initiatives identified to move distributed learning/multimedia initiatives forward at Kent State University. Kent is continuing to identify new interests and goals of faculty who wish to work in this environment. Through an ongoing pilot project effort, Kent hopes to deepen its understanding of distributed learning and provide value to the higher education community as well. Through presentations at CAUSE and other national conferences, the Kent experience can be shared with others in the higher education community. By this means developments at Kent can be brought to bear on the national dialogue regarding the strategic use of multimedia/distributed learning technologies in education.

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Computing Center/Library Cooperation in the Development of a Major University Service: Northwestern's Electronic Reserve System

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ABSTRACT

The design and implementation of a network-based document distribution service within a university entails careful planning, considerable communication, and coordinated action between computing center and library staffs. Northwestern University's experience in developing an Electronic Reserve System (ERS) offers a case study of the several elements requiring coordination, including software distribution, system design, the recruitment of faculty for testing and early implementation, and evaluation. This review of Northwestern's ERS highlights how coordination between the two organizations was accomplished, what conflicts were faced and how they were resolved, and how ongoing development of this successful service is being managed. A number of useful insights into organizational roles and boundaries have emerged from this experience, offering a perspective on the relationships between service offerings of library and computing center organizations and how such offerings might change in the future.

Computing Center/Library Cooperation in the Development of a Major University Service: Northwestern's Electronic Reserve System

INTRODUCTION

Although libraries and academic computing organizations both seek to support research, teaching, and learning on campus, they often conceive of and develop services in isolation from one another. This tendency to operate in isolation may arise from differences in organizational culture, varied levels of technical expertise, or turf issues. The isolated approaches may also be due to the simple fact that people in each of the two organizations just don't know what people in the other organization are doing or are supposed to be doing. Regardless of the reason, this style of operation often results in competing services, or services whose availability is confined to one set of facilities, does not serve users well, and does not scale well. Instead, when libraries and academic computing organizations collaborate, they can design and deliver services which effectively meet user needs and advance research, teaching, and learning.

Northwestern University's experience in developing an Electronic Reserve System offers a case study of collaboration between academic computing and library organizations. The design and implementation of this network-based document distribution service entailed careful planning, considerable communication, and coordinated action between computing center and library staffs. A number of useful insights into organizational roles and boundaries have emerged from this experience, offering some perspective on the relationships between service offerings of library and academic computing organizations and how such offerings may change in the future.

The goals of the two organizations in developing an electronic document delivery service were not identical, but were complementary. What could have been competing goals — actually political jockeying for administrators' attention and resources as both organizations sought to exploit what the economist and organizational theorist Anthony Downs has called policy space created by a new technology gap[1] — were organizational objectives which were articulated with each other so as to drive both units toward the creation of a system with dimensions larger than either could have carried out on its own. There *were* conflicts, of course, but they were resolved through give-and-take as both organizations saw advantage in moving forward rather than letting the work stall.

This paper reviews the recent historical development of Northwestern University's Electronic Reserve System and describes the system's components, functionality, and interim evaluation. A further goal the paper strives for is to offer some perspective on how academic computing organizations and research libraries might better recognize where each others strengths lie, and thereby foster further development of projects which make a real difference in the learning environment of the university.

THE ELECTRONIC RESERVE INITIATIVE AT NORTHWESTERN UNIVERSITY

The main purpose of Northwestern University's Electronic Reserve System (ERS) is to support instruction in the University by providing course-support materials via the campus network. The project was initiated in early 1994 by librarians who were interested in developing a new service for delivery over the campus network while exploring the technical and policy issues involved in digitizing text, and by academic computing staff concerned with extending and refining communication systems already in wide use around the university. At the same time a task force was established with volunteers from several library departments to design and implement some system to offer electronic text, the academic computing organization was launching a number of instructional support initiatives including listservs, conferencing, and faculty Internet training. As the library was seeking avenues for development of new electronic services which had a clear library identity, academic computing was focused heavily on the wiring of all

dormitory rooms and academic buildings, and sought to develop systems which would demonstrate to senior university administrators the validity of their own forward-thinking decision to invest heavily in network infrastructure at this time.

Along with these local forces leading both organizations to share in development of a new university resource, there has been a larger economic and legal pressure motivating the participants to implement the Electronic Reserve System in a timely fashion. That pressure is the issue of electronic copyright, specifically the strong interest the university has in preserving the principle of fair use in the new electronic environment. There is a lot of talk about copyright issues now, with the promulgation of the NII White Paper on Intellectual Property and the National Information Infrastructure,[2] the ARL statement on "Fair Use in the Electronic Age: Serving the Public Interest,"[3] and a draft electronic reserve guidelines document now under discussion within the research library community[4]. Northwestern recognized that it was important to reinforce the stated philosophical position that the fair use provision should remain operative in the new environment with a body of practice which concretely demonstrated that position. Saying that it SHOULD be acceptable by law to do something over which there may be disagreement is not the same as actually doing it. With our project, Northwestern has taken the position that the larger higher education community is not well-served by remaining in a state of paralysis on the electronic copyright issue. We have felt it important to show that a system can operate in a way respectful of publishers' financial interests yet firmly assert the fair use right that sets a limit on the protection of copyright holders.

ERS SYSTEM DESCRIPTION

The Electronic Reserve System began as a gopher-based document delivery system using the Gopher Plus Internet protocol. At the beginning of the 1995 academic year, the system migrated to a World Wide Web interface. Users must have a copy of a forms-capable Web browsing client (Netscape is the supported Web browser at Northwestern) and a connection to NUNet, Northwestern's campus network backbone, either through a direct Ethernet or a remote modem connection. The Electronic Reserve System at Northwestern may be accessed by any student, faculty, or staff member from all networked computers in the libraries, campus computer labs, dormitory rooms, and other campus buildings. Because access to ERS is restricted to the Northwestern University community, those users connecting via a modem from their homes or anywhere else off-campus must attach directly to Northwestern's modem pool through a SLIP connection.

The ERS Web site and documents are housed on the Library's Web server, an E-series Hewlett Packard UNIX server running Netscape Commerce server software. Its design structurally mirrors the gopher prototype used in the 1994-95 academic year, which was run on an HP 715-33 workstation. Users are offered two modes of access to the reserve materials, a "browse" mode and a "search" mode. The browse mode offers the user an ability to traverse a hierarchical tree of university schools, departments, and courses to locate material for a particular course, provided in a list. The search mode enables the user to locate ERS documents through searching by professor, department, or course name, either as single words or as multiple words combined through implicit or explicit boolean operators. The index, developed originally using Jughead in its first life as a gopher, is now built by SWISH, (Simple Web Indexing System for Humans), a free software product developed at CNIDR. Users are not permitted to locate any item through an author or title search, a design element deliberately made in consideration of copyright issues, issues to which we will return later.

Most of the documents distributed through the Electronic Reserve System are in Adobe Acrobat Portable Document Format (PDF). During the spring and summer of 1994, academic computing tested a number of electronic publishing tools, including Common Ground and Replica, before settling on the Acrobat family of products. Adobe's decision in 1994 to distribute the Acrobat Reader at no charge solidified this decision; the Reader may be downloaded directly from the Electronic Reserve home page or the NUInfo Campus Wide Information System and used as Netscape's helper application to view Electronic Reserve documents as well as many other documents published electronically for general

campus use. Users may both view and print documents with the Acrobat Reader. Acrobat PDF files also support internal hypertext links and, with the latest release of the Reader, external hypertext links to locations on the World Wide Web and embedded Quicktime movies.

Acrobat PDF is based on the Postscript page definition language and can incorporate both text and bitmapped images. Documents in PDF appear onscreen in their electronic format much as they would on paper. The commercial products used to create these files are Acrobat Distiller, which will convert any Postscript text or graphics document directly to PDF, and Acrobat Exchange with its included PDF Writer. The PDF Writer acts as a printer driver with which the operator may literally print to a Portable Document Format file from any application. Exchange is used to collate and edit existing PDF files, to attach security specifications to individual documents, and to provide value-added document navigation features. We have also begun working with Acrobat Capture, a product which melds optical-character recognition functionalities with the other Acrobat products in use at Northwestern for nearly two years.

Documents are prepared by library staff in a number of ways. Documents which already exist in electronic format are the easiest to handle, and are welcomely received from faculty members; they are simply "printed" to PDF from the originating application with the Acrobat PDF Writer. To encourage use of this format, academic computing has also "seeded" Acrobat Exchange into a number of academic departments, enabling faculty to produce PDF files by themselves for use in classroom conferencing applications supported by the computing organization. This method is most commonly used with examinations, course syllabi, handouts and lecture notes. The faculty members can simply email as attachments such PDF files to the reserve staff who then make links to these files on the server.

Documents provided by faculty in paper format, such as journal articles and book chapters, are scanned. They may be converted to PDF as bitmapped image files, or are sometimes scanned and converted to text and then to PDF using an Optical Character Recognition (OCR) application. The decision whether or not to use an OCR package has been mostly based on the length of documents. Pages composed of bitmapped pictures of text characters are, without exception, a great deal larger in file size than those which contain recognizable text, but the time involved in using an OCR application, and its often mixed recognition results, has often made it an impractical choice for producing and distributing course materials. PDFs built from bitmaps are also slow to deliver over the network, and are essentially unprintable, though on-screen reading is possible and acceptable, if not always accepted.

We expect our recent purchase of Acrobat Capture to make documents existing initially only on paper to be much more amenable to network distribution, and thus to lead to much more scanning work. Capture's page-to-PDF handling of documents and its ability to retain both text and graphics in their original page layout, along with providing a very useful interface for human operator interpretation of OCR uncertainties, will also signficantly improve the slow printing problems our students now face.

The library owns three workstations dedicated to the production of Electronic Reserve materials, two Power Macintoshes and one Pentium PC. Each is equipped with a color desktop scanner, scanning software, the complete Adobe Acrobat suite (Distiller, Exchange, PDF Writer and Reader) and is attached to the network. Acrobat Capture is only installed on the PC as a version does not yet exist for the Macintosh. Common office applications which faculty may be using for authoring their original documents, such as Microsoft Word, WordPerfect, PowerPoint, and the like, are also on hand so that conversion through PDF Writer of such documents is possible. Three additional Wintel-based production workstations are planned for other library departments participating in Electronic Reserve.

Besides ERS availability being provided in all academic computing labs in the university, library-managed public workstations are in place in the Reserve Room on the Evanston campus and in the Schaffner library on Northwestern's Chicago campus. The public Macintosh and PC in Reserve are both equipped with DeskJet printers; the public PC's in Schaffner are connected to a laser printer. Three additional public workstations will soon be installed in the Transportation, Music and Science and Engineering libraries. Beyond the libraries, the Acrobat Reader software is installed on all machines in all

the University's academic computing public labs. All printing in all locations — currently over 100 workstations in public labs and reading rooms — is at this time free.

For the first year of the Electronic Reserve project, materials were produced by staff in the Reserve Room of the Main library and staff working in the Schaffner. In August, 1995, a half-time professional position was added in Main Reserve; ERS demands the equivalent of one full paraprofessional position and one student work/study position from this department. The Schaffner staff member processing materials for ERS was able to incorporate his new responsibilities into his existing workflow. The Electronic Reserve task force continues to act in a planning, advisory and technical support capacity and currently consists of representatives from the music, transportation, science and engineering, preservation, and media departments of the library, as well as academic computing. The newest members of the task force have been additional participants from academic computing who have joined to lead the development of an Oracle-based database management system at the back-end, to tackle the automation of ERS administrative tasks.

SYSTEM EVALUATION

User evaluation of the Electronic Reserve System has so far not been analyzed in particularly formal ways, though comment from staff, faculty, and students have from the beginning contributed to design modifications to the system. Transaction logs of both the gopher and web iterations of the systems exist, though we've not exploited them for evaluation purposes as yet. Feedback from academic computing lab managers reveal that the use of ERS appears to be one of the most popular applications in all our labs, leading to additional growth in lab use and demand for printing. Student feedback is encouraged both via an electronic form on the web site and a paper questionnaire left at the library public dedicated ERS workstations. Student responses have in general been quite favorable, though problems with slow document printing are a source of significant frustration. Our expectation that students would read PDF files on-screen has proven to be naive; just as students often retrieve paper reserve materials simply to photocopy them, they retrieve the electronic files with the idea of printing them to paper. Printing delays are interminable with scanned/bitmapped PDF's, and often only tolerable with PDF files created from electronic originals, especially those with non-textual elements. Thus the nature of the materials placed on electronic reserve colors significantly the students' overall evaluation of the system.

Apart from some users' frustration with printing ERS files, other problems encountered have centered around users becoming more comfortable with the electronic interface. Requiring off-site users to acquire, install, and configure the Acrobat Reader software has caused some frustration, especially among users with older equipment and those who are unfamiliar with the functioning of their operating systems. We hope this particular difficulty will be reduced with the next releases of the Netscape browser and Acrobat Reader, which will allow users to view and print PDF documents from within the Netscape browser itself. We have also encountered students whose Internet access has been through external providers, such as Compuserve or Prodigy, and who thus are blocked from retrieving electronic reserve documents because their IP addresses do not reflect their Northwestern affiliation. Pointing out to them that they can overcome this problem by obtaining a free account and software from academic computing is of course appreciated.

Faculty have expressed interest in the system, but have been somewhat slow to respond. The most enthusiastic responses so far have been concentrated, with a few exceptions, in the graduate school of management and among faculty teaching in the sciences and engineering. Currently, twenty-one courses are supported on ERS in this Fall 1995 Quarter. A number of the faculty participating in the ERS project have been initially identified through their enquiries directed at academic computing staff in the areas of classroom conferencing, the use of electronic mail as a teaching tool, and their interest in linking self-produced web resources into the existing Campus Wide Information System infrastructure.

The migration to a World Wide Web interface has added more flexibility to the types of materials which may be distributed via the Electronic Reserve System. Rather than limiting course information to

materials processed by library staff and stored locally on the library's web server, as had been the original model for Electronic Reserve, ERS pages now include links to other Internet sites. These sites include professors' personal or departmental gopher and web resources, newsgroups created specifically for university courses, and other Internet sites of interest. It is hoped that the Electronic Reserve System will no longer be seen merely as an electronic version of traditional reserve, but rather as a central gateway to student's course materials located at various electronic sites on campus and around the world. This approach to ERS offers faculty greater control of the organization of materials they place "on reserve," reinforces the library's gathering role by eliminating the need for faculty to communicate to students what are often long and complex URL's, and offers the institution a more unified approach toward dealing with copyright permission issues which will become increasingly contentious in the new electronic environment.

INTER-ORGANIZATIONAL COOPERATION

Both library and computing organizations made critical contributions to the development of this successful system. Librarians came to the project with a long experience in providing course support materials through traditional reserve functions and in developing successful information retrieval systems. This experience included considerable knowledge about copyright issues. They also brought a strong mission to serve all faculty and students — not just those interested in technology. The University Librarian was also willing to commit financial and staff resources to the project. The academic computing organization supplied a higher level of technical expertise than was available in the library as well as access to software and hardware resources in the development phase. It also provided a more current perspective of the development of the larger campus network. Academic computing made critical connections with Adobe, with faculty interested in participating in the pilot project, and with its own staff who would be responsible for implementing the system in computing labs. Finally, the academic computing representative approached the project with an experimental method new to many of the librarians, allowing the project to assume risks and move forward more quickly than one sees with most library projects.

The collaboration between academic computing and the library resulted in a more successful service than either organization could have developed independently.

A remarkable feature of the electronic reserve system in the eyes of many was that it was developed, tested, and implemented very quickly for a system of its size and complexity. Planning and design work was begun in the summer of 1994, a pilot was launched in the fall of 1994 in which over a dozen classes participated, and a production system was in place by the fall of 1995. During that time, the user interface was also rewritten and transported from gopher to the worldwide web. This rapid progress would have been highly unlikely in a project developed solely by the library with its more deliberative development style. The academic computing organization possessed greater technical expertise particularly in the areas of software selection and programming, as well as easier access to machine resources during the pilot phase. Although the initial server was a machine owned by a library department, it was managed by the academic computing organization. In addition, the academic computing organization was accustomed to developing projects quickly and delivering them to users without elaborate testing or extended internal review. The library task force elected to share in this development style, which allowed the project to move along quickly without much reporting to regular library review groups. As stated above, the motivation to bring forward a body of practice in the area of electronic copyright fair use proved a valuable spur to action across both organizations.

The interest in a speedy implementation led to a number of decisions being made that would have been much slower to implement had each organization felt they were working alone, clearly a synergy effect. The library implemented public Internet-accessible workstations in its reserve rooms so that user behavior could be observed and the system modified accordingly. At the same time the academic computing organization offered the service in its public computing labs, a practice that had not been so automatic in previous library projects. The representative from academic computing was able to work

closely with the lab coordinators to insure that properly installed software was available and to address implementation problems as they occurred, rather than awaiting a hierarchical organization-to-organization communication process. This widespread implementation allowed many more students to access and experiment with the system than if access had been limited to a few public workstations in the library. Electronic reserve quickly became one of the most frequently used services in the public computing labs. Academic computing was also able to introduce the system as part of a suite of network applications that students were introduced to, rather than identifying it as a specialized library project. The computing staff approached the new system as just one of many that they had to implement and felt some ownership of the system. The sense of shared ownership, rather than a working relationship in which the computing organization merely offered technical advice on a system developed outside by the library, was critical to the project's success.

INTER-ORGANIZATIONAL CONFLICT

One should not regard the success of the Electronic Reserve System as a simple matter of interorganizational efficiency, as there were areas of conflict too. Recognizing that such conflicts are bound to exist can go a long way toward resolving them without their becoming insurmountable barriers which could otherwise cause similar projects to stall. We present here some examples, to demonstrate that teamwork often entails compromise.

One early difficulty encountered by the project occurred during the year-long pilot phase, when the delivery mechanism for reserve documents was gopher-based. Although Northwestern's computing organization had not at that time settled on which graphical user interface Web clients would be supported campus-wide, we had settled on gopher clients, as our rapidly-developing NUInfo CWIS was at the time gopher-based. The clients supported on the dominant platforms were TurboGopher and WSGopher, and Internet program disk suites were already being widely distributed among students and faculty interested in net connections. The library, on the other hand, had instituted their own process for deciding what software would be on library microcomputers, and had chosen the Boston College gopher as the preferred gopher client because of its uncluttered design. Though in most circumstances this library decision would not have significant impact beyond its own walls, the fact that the Boston College gopher did not support the gopher plus protocol, necessary for easy integration of Acrobat documents with the ERS user interface, the library was forced to revisit the decision as a result of the ERS project. Faced with the problem of weighing additional decision criteria that had not been recognized before, the library did reverse itself and supported the WSGopher as a standard, but the loss of autonomy in this case was for a while a sore point.

On the other side of the inter-organizational process, academic computing at first did not support the library's strong interest in delivering electronically-scanned documents through the ERS. Computing staff advocated restricting the service to documents which were natively available in electronic form, so that the corresponding Acrobat PDF files would not be extremely large and the copyright issues would be non-problematic. From the library's perspective, this restriction was absolutely untenable. Library staff argued that, even if printing and network delivery times were to suffer, a system calling itself a library reserve service *had* to accomodate paper documents if it was to maintain credibilty in the eyes of the faculty. Even though it is recognized that the decision has some service efficiency costs, both organizations now recognize the value the decision has had, especially in the area of setting prescedent in fair use of copyrighted material.

Still another area in which conflict has arisen, in this case within both organizations internally, has been the question of the viability of the Adobe PDF format as a reliable technology for sustained service delivery. Soon after the introduction of the Acrobat technology, there was widespread outcry from the SGML community that a format-description language such as PDF invited rapid document obsolescence, and this consideration led many in the library community to look upon Acrobat suspiciously. From open-system oriented technologists, there was similar concern about PDF. Why not just put up all the information in HTML, it was asked. This view has often been articulated despite the fact that the PDF specification is published, likely we suppose because of Adobe's status as a for-profit corporation. Both

sources of objection to the Acrobat format have been quieted by the passage of time and the growing popularity of the technology, and it is recognized that the current difficulties with HTML authoring, the far distance HTML is from SGML in terms of capturing semantic meaning, and the quite transient nature of most reserve documents all confirm that the ERS decision to go with Acrobat has been wise.

CONCLUSION

Not only was its implementation smoother and faster, but the Electronic Reserve System has reached a broader audience of users than a service developed by either library or computing organization would have. Academic computing organizations tend to develop services for users who are interested and motivated to use technology. Libraries, the other hand, have always had broader mission to serve all user groups on campus regardless of their interest in technology. Because of academic computing's involvement, technology leaders among the faculty were recruited for the pilot project. Because of the library's involvement, the system was designed and promoted as service for all students regardless of their level of technical expertise and interest.

While the library could probably have developed an electronic reserve system on its own, it is doubtful that it would have been as innovative as Northwestern's electronic reserve system without collaboration with academic computing. The academic computing representative had already established a relationship with Adobe that led us to choose Acrobat Reader as a delivery mode before it was commonly in use. As we developed the system's gopher version, we had good support from the developers of WSGopher and the Minnesota gopher team. As ERS has been transported to the Web, we have been able to coordinate web development with other new projects in both academic computing and the library.

This collaboration resulted not only in an effective and successful electronic reserve system, but it also built and strengthened the relationship between the academic computing organization and the library. The differences in organizational culture between the two groups have been much discussed. As we worked towards a common goal, all team members developed new understanding and became more respectful of the human and political elements in both organizations. We developed a methodology which moved ahead quickly, but which included enough reporting and review to satisfy the library. We avoided many turf issues and minimized conflicts which often arise when organizations develop projects separately but implement them together. We established relationships which can and will carry over into other projects and initiatives as we build and enhance information technology across the university.

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[1] Anthony Downs, Inside Bureaucracy. Boston: Little, Brown, 1967.

[2] http://www.uspto.gov/web/ipnii/

[3] http://arl.cni.org/scomm/copyright/uses.html.

[4] "Fair Use Guidelines for Electronic Reserve Systems," available within the listserv archive of July 1995 for the arl-ereserve list, at listproc@cni.org.

IT SERVICE FOR ACADEMIC UNITS: THREE PERSPECTIVES

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Three institutions vary greatly in the manner in which academic departments receive IT services. A central computer services unit provides the IT infrastructure at Messiah College, a small private Liberal Arts college, and works with the academic departments in budgeting and prioritization of projects. The School of Education at Cal State Los Angeles, a medium-large, urban, public, comprehensive university, has IT infrastructure and certain services provided by the central administration with one FTE IT technician to augment services. The Department of Chemistry & Biochemistry, at UCLA, a large urban public research university, provides much of its own IT infrastructure and services. Services and strategies are described, differences examined, and critical success factors are highlighted.

IT SERVICE FOR ACADEMIC UNITS: THREE PERSPECTIVES

MESSIAH COLLEGE

Introduction and Background

Messiah College is a college of the liberal and applied arts and sciences located ten miles southwest of Harrisburg, Pennsylvania. It is a four year undergraduate institution with most of its 2,400 students living on campus. A wide variety of off-campus opportunities do exist, however, including a semester or year of study at Temple University.

Information technology resources have always been centralized for both academic and administrative computing. Like many other small colleges, IT services grew out of the Mathematical Sciences Department which at Messiah includes a computer science major. Early work in academic computing was primarily focused on meeting the needs of computer science majors; later it incorporated the Business and Engineering Departments, and then the rest of the campus.

Services Provided

For a small residential college, Messiah provides an environment rich in technological resources. The campus network backbone incorporates all academic and administrative buildings, the Learning Resources Center, and dormitories. Ethernet and Novell software are utilized in the system. In total, 10 computing labs provide easy access to over 200 microcomputers most of which have 386 or 486 processors. Many students bring their own computers and are able to access the network from their dorm rooms. For students who need more computing power, Pentium 120 MHz systems as well as SUN SPARCstation 20 machines are available in a special lab. In addition to computers in common labs, the IT staff supports many classrooms with 486 machines connected to local area networks and the campus backbone which are used with LCD panels in instruction. A faculty resource room also provides a place where new technology may be tried out by faculty and staff.

Software resources have grown tremendously in recent years as more faculty incorporate the use of technology in their teaching. Access to software through the networks comes through a common interface menu which is present at network login. Menu choices are given based on the level of access provided to the individual account as well as the lab from which the login was made. Because of excessive use of email and word processing from labs which includes our most powerful machines, access to some programs has been limited. Common software provided to most labs includes email (Pinemail for Students, HP Desk for faculty and staff), word processing, spreadsheet and database applications. Other programs for specific majors includes AutoCAD for Engineering, Lumena for Art, and Derive for Math. Faculty are also making more use of software which may come as part of adoption of a text for a course. Thus, Economics faculty may incorporate the use of an economic simulation, or a Sociology faculty member may use a database that is provided with the text in a research course.

Another major use of technology for the College has become the use of the Internet, and specifically browsing tools on the World Wide Web. Like many colleges, the first use of WWW was what has become commonly known as "surfing" where activity was not necessarily connected to a teaching or research agenda. While this type of activity still takes place and is seen to have value, several professors are using the Web as another way to gather data or information that can be incorporated into an academic assignment. Thus, it has become common for students to use the Web to locate home pages which may lead them to information used in a research paper, communicate with someone on a subject of interest, or use the Web in presenting a report to a class. For a campus far away from a large city or major university, the Web has become a vary valuable resource.

Because of the number and variety of academic resources, along with a limited IT staff, technical and developmental assistance has been limited. It has been the approach of the IT staff, supported by the administration, to limit the microcomputer purchases to a single vendor (which may change every few years), and to restrict the variety of commonly used software packages available through the network.

In this process they have adopted a layered approach to support of machines and software. Simply put, there are three layers of support: machines and software that are considered the standard for the campus, machines and software that may have limited use for a particular department, and machines and resources that are not considered as part of the campus standard and receive limited or no support from the IT staff. The level of support determines whether the resource is able to be connected to the network, whether training and user support is offered, and whether maintenance and upgrades are supported. At this time, these decisions are made by the IT staff.

Strategies

For the past ten years, the College administration and Trustees have given strong support to the development of IT resources on campus. This may well have come from their belief that such resources were vital to the College growing and providing quality education than calls from the faculty to increase resources. The direction for development of IT resources has continued to come from IT management who have stressed the development of hardware and network resources. One example of this was the recent construction of a 70,000 square foot academic building to house the Business, Mathematical Sciences and Engineering Departments. In the construction of this facility, a substantial investment was made to make the building ready to utilize technology whether it be in computer, science or engineering labs, classrooms, or faculty offices. In all the development of resources at the College, there has never been a charge-back system for the use of technology.

While the College is rich in IT resources their use in the instructional program has progressed slowly by the faculty at large. Like so many colleges of all sizes, the "first wave" of computer users wasted no time in seeing how the new technology could be used in the curriculum. At Messiah, this group included a few faculty mostly from the Math and Business Departments. The "second wave" introduced another dozen or so from a variety of disciplines who were mostly interested in how a particular software program might relate to a course that they taught. We are just now entering the "third wave" of users which could bring the total active user group of those who are seeking to incorporate some aspect of information technology into the classroom to a significant percentage of the total faculty.

Why has the number of active users among the faculty ranks been so slow to grow and make use of the substantial resources available on campus? Certainly many factors have contributed to this situation. Part is certainly attributed to the fact that the responsibility for developing IT resources came out of the Mathematical Sciences Department which was primarily interested in developing hardware and network resources. It is also partly due to the fact that there has never been a senior administrator responsible for IT as his or her primary focus. Another major factor is the limited input faculty have had in developing IT resources during the most substantial building years. These along with the absence of a strategic plan for academic computing has created an environment where there is strong hardware infrastructure from which to draw from, but where individual faculty must take the lead for the availability and use of software resources that they deem appropriate. In cases where their software is not available on the platform put in place by the IT staff, they are out of luck. For first and to some degree second wave users all this has been a manageable problem; yet, it represents a substantial problem for most others on the faculty.

Critical Success Factors

Former Times:

In their own way of thinking, the IT management and staff has always considered themselves to have had a "service orientation" to the users. Certainly their individual attention to faculty who came to them has allowed them to address specific needs of some faculty. Yet, the absence of an open and managed process for allocating resources has in the past made them appear more political than they perhaps deserved to be labeled. Service was seen as more a result of "making a deal" with IT management than as result of an open and fair process. The lack of any kind of evaluation instrument processed on a regular basis did not allow for user input as a group.

Prioritization of projects has been another weak area for IT management. Being run either through or with close collaboration with the Mathematical Sciences Department has made many faculty suspect. Certainly, evidence is clear that the best equipment has gone to the computer science labs. This perhaps is justified by the applications they are running in those labs; however, the fact that this is not decided as an open process has been a problem.

Another problem for IT staff has been that much of the current infrastructure has been developed during times when extra financial resources (e.g., with growth in the Freshman class) are available. Thus it has been difficult to build the infrastructure with a multi-year planned approach.

Finally, training and development has been difficult for IT staff as the number of students and faculty utilizing IT resources has grown while their staff has not.

Present Times:

In the past few years at the College, there has been a major shift in the management and delivery of IT resources to academic users. For the first time, the responsibility for IT has become independent of the Mathematical Sciences Department and has been placed with an individual who reports to the President. An active academic user committee is in the process of creating a strategic plan and will recommend prioritization of budget and IT projects on an ongoing basis. The governance document of the institution was changed so that the Associate Dean of the Faculty will, by position, chair this committee. This allows for focus on efforts to integrate IT into the curriculum. Budgeting is also being done on a multi-year basis where a special fund allows for maintenance and upgrades of hardware and software. Decisions have also been made to move to software packages for applications like email that will not necessitate training sessions. These are some of the factors that are contributing toward a successful approach for addressing user needs.

Conclusions

In some ways, one could argue that the College has failed to address the needs of many of its faculty and students in the past by focusing too much on the interests of a few faculty and spending too much time and resources on hardware purchases and network development. Yet, there have been benefits of a highly centralized approach in creating the campus infrastructure. The campus backbone, local area networks, labs, classrooms, and many other IT environments now provide a stable environment on which faculty and students may build.

The key critical success factors for the future will depend to what degree leadership and management for building on those resources comes from the broad group of academic users on campus, and to what degree senior management sees IT as a vital part of the College program. Should the focus shift from infrastructure to applications that address curriculum and research interests, then this small college will be able to offer something quite valuable to its students. If support is not there for this shift, either by senior administration or IT management, then IT resources will be underutilized and ineffective in addressing faculty and student needs, and substantial financial resources will have been wasted.

CALIFORNIA STATE UNIVERSITY, LOS ANGELES - SCHOOL OF EDUCATION

Introduction and Background

Cal State LA is a public, comprehensive, urban campus with just under 19,000 student headcount. The Graduate School of Education, one of six schools, has about 2,300 students. The Information Resources Management (IRM) division headed by a vice presidential level CIO has policy responsibility for all information technology projects in the university and provides the basic IT infrastructure for the campus. The office of Academic Technology Support (ATS), one of the IRM units, provides campus wide services to academic departments and has 34 full-time positions, six of which are located in various schools across the campus. Administrative computing is provided on an IBM ES9000, academic computing is supported by a network of Sun servers, a dedicated Unix based library system, a multi-processing Sun server with over 1,500 research databases, and a minisuper computer. All full-time faculty in the university have a networked computer on the desktop with access to both academic and administrative applications.

Services Provided

The Instructional Technology Support group contains 11 positions and provides administrative office, workstation maintenance, user, and technical support services. The Network Information Services group contains 9 positions and supports the Instructional Technology Center, small systems, and database administration. Four of the school based positions, including the one in the School of Education, are in the small systems area. The Network Operations group has 10 positions and provides systems development and network/distributed systems services. There are approximately 60 student assistants and half a dozen graduate assistants in the organization. The campus backbone is a FDDI network. There are 37 academic computing (three in the School of Education) and 10 experimental laboratories containing over 1,100 microcomputers across the campus. All of the student machines are 486 class or better; about 15 percent are Macintoshes. There are approximately 40 Sun workstations in the mix. An additional 600 faculty desktop machines are supported. About two-thirds of them are 486 or better class machines and the remainder are 386 class (again about 15 percent are Macintoshes). The laboratories are supported by distributed Sun servers and over 100 software packages are provided. All of the student machines have Netscape, access to a wide variety of CD-ROM and other bibliographic databases, the automated library system, and access to various network servers. There is a 72 port modem pool to support dial-in access. And an agreement with an Internet service provider for 60 hours per month at a nominal rate is available to all students.

Strategies

The centralized ATS staff provide overall planning and coordination for services and the network, negotiate site license agreements, maintain the servers, desktop machines and supported software, provide documentation and training, run the large general purpose laboratories, provide a server based email system, bulletin board, WWW, etc. (in general, support the basic infrastructure). The school based specialists provide direct support to the faculty, maintain local area networks, support software peculiar to a given laboratory, and assist in setting up the labs for special classes. CSLA has a policy of no charge back for academic services.

The IRM division was established in the mid-1980s and over a six year period installed the campus-wide network, expanded from about a dozen labs to almost 40, grew ATS from less than ten FTE positions to over 30, moved from a mainframe for academic support to the distributed client/server model, installed a new RDBMS based administrative system, and developed a strategic planning process for campus-wide IT. In the early 1990s, the California State University System experienced major funding cutbacks resulting in approximately a 30 per cent reduction in the IRM operating budget. Every effort was made to keep the academic support intact in ATS but some cuts were made and continued growth to keep up with the campus-wide expansion of information technology could not be maintained. Between spring 1994 and fall 1995, IT lab utilization increased by over 400 percent, library sessions increased from about 1,000 to 2,000 per day, in spring 1995 alone there was a net addition of 125 workstations on the network with no additional resources for ATS. Also in this time-frame, due to changes in administrative positions, ATS planning and coordination activities moved

from working closely with Academic Affairs and the academic deans to working almost exclusively with the academic deans.

A fall 1995 faculty survey conducted by the Academic Senate showed that from 101 respondents, approximately 60 percent were somewhat or very satisfied with the Scholars Work Environment[1] (the common interface on all networked machines which provides access to the various resources) versus about 31 percent who were somewhat or very dissatisfied. A question regarding Scholars Mail (the server based email system) showed about 46 per cent of on-campus users somewhat or very satisfied versus 42 percent somewhat or very dissatisfied (n=112). The same question from 85 off-campus users showed about 24 percent somewhat or very satisfied versus 53 percent somewhat or very dissatisfied. Some 55 percent of on-campus Macintosh users were unhappy with Scholars Mail and 59 percent of off-campus Macintosh users were dissatisfied to some degree. Of 104 on-campus respondents, 60 percent indicated occasional or frequent problems encountered in the last quarter. And of 80 off-campus users, 62.5 percent reflected some level of problem occurrence in the last quarter.

Critical Success Factors

During the initial years of IRM as the network grew, additional resources were able to be allocated to support the growth. Also, during this period of time, significant efforts were employed to persuade faculty to increase the use of information technology in the classroom. When the budget crisis hit, despite the fact that ATS was cut less than any other part of IRM, it could not keep up with the continued need for more and more services (even though resources were reduced, the growth curve having been built for several years did not level off). Indeed, it is feasible that the budget cuts may have accelerated the use of technology by faculty and students as new and sometimes dramatic resources became available on the Internet.

The early success of SWE led to the development of a client/server based email system designed to be integrated into SWE. For a variety of reasons, it did not provide the same level of service as other email systems with which it was compared--this was especially so for off-campus and Macintosh users.

Conclusions

The IRM division and the ATS unit developed a faculty and student oriented posture over a several year period. That led to the establishment of an expectation level that could not be fully maintained when state resources were significantly reduced. The situation is made even more difficult since the growth in faculty and student usage has continued to increase while ATS resources have remained level at best.

UCLA DEPARTMENT OF CHEMISTRY & BIOCHEMISTRY

Introduction and Background

The UCLA Department of Chemistry and Biochemistry, ranking ninth in the nation, is comprised of 47 faculty, 15 emeriti (with 10 in residence), 61+ FTE administrative/departmental support staff (83 headcount), 71 research staff, 69 post graduate students, 1,188 graduate students, 2,659 undergraduate majors and 150 TA appointments. Annually, the Department provides lectures for up to 10,000 students from the campus and holds instructional chemistry labs for 7,000. This $31M operation is funded through state funds, university funds, various gifts and donations and annual contract and grant research funding of over $11M. Of the $31M, $2.5M can be considered "operating funds" for the ongoing support of departmental staff and support salaries, administration, and instruction.

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[1] Donald Carder and James Penrod, "Providing Access for The Scholars Work Environment (SWE)," *Proceedings of the 1994 CAUSE National Conference*, (Boulder, CO: CAUSE, Nov. 30-Dec. 2, 1994), III-5-1.

Organizationally, the Department is managed by the Chair, Vice Chair, Executive Committee and Chief Administrative Officer (CAO). Comprising the support infrastructure of the Department are Offices of Personnel, Business, Mail and Information, Graduate and Undergraduate Offices, Chemical and Research Equipment Storerooms, Receiving, Machine Shop, Glass Shop, Micro Computing and Electronics Shop, Computer Services, Mass Spectroscopy Lab, NMR Lab, X-ray Lab, and support units for the various Instructional Labs.

Four years ago, the California state budget began to have a very negative impact on the departmental level budgets at UCLA. During the ensuing years, over $800K was cut from the operating funds of Chemistry and Biochemistry. A proactive and realistic departmental budget required a thorough review of all expenditures and management strategies. Each item was reviewed, sub-budgets for each of the various units was instigated for management by the personnel directly responsible for each unit. This process necessitated the layoff of many personnel; however, at the same time it was recognized we could not operate in a "computer vacuum" and new workstations and software, better LANs, and email packages were purchased or employed. Faculty were given one-time departmental allocations of $1500 each to buy additional computers or peripherals to accommodate for the loss in secretarial staff.

Services Provided

Central computing at UCLA is supported by the Office of Academic Computing (OAC) serving the research community and Administrative Information Services (AIS) charged with only central administrative system development--not departmental. Therefore, it is incumbent on the Department of Chemistry and Biochemistry to operate it's own IT infrastructure. The Department maintains a 180-node Ethernet computer network with two interfaces to a CISCO router, and an 18-node Token-Ring network. Internally the Ethernet network is further split into multiple bridged and brouted segments to minimize the traffic. TCP/IP, DECNET, AppleTalk, and IPX/SPX protocols are supported on the Ethernet network and only IPX/SPX on the TokenRing/Novell 3.11 network. The departmental networking is centered around four LANNET LET-36 Intelligent Hubs with multi-channel (4 Ethernet, 3 FDDI/TokenRing, and 2Gbps Hi-Speed) backplanes. The LET-36 Hubs containing segment-switchable 10-BaseT modules, Brouters, FOIRL modules and Terminal Servers are SNMP-compliant and are managed through MultiMan Network Management System. Networked computer equipment is manufactured by Apple, IBM, HP, SGI, Sun FPS (Cray) and other vendors. In addition to the standard TCP/IP applications, there is a Client-Server Electronic Mail system (Eudora 2.1.2), a departmental Gopher server, and a World-Wide Web service using Netscape. This infrastructure serves over 400 networked Apple Macintosh, IBM PC and compatibles, Unix workstations and servers, and VAX workstations distributed between faculty and staff offices, research labs, teaching labs, shops and service areas. By and large, the Department is considered to be a "Macintosh shop."

All members of the Department--students, staff and faculty--have access to email, WWW, Gopher and FTP servers. The WWW for Chemistry (accessed 1,000 times daily from around the world) includes complete descriptions of each faculty member's research, course listings, departmental calendars, and hundreds of other chemistry resources. The most common software and user interfaces used in the Department include: DOS/MS Windows, MacOS/Finder, Unix/X-Window System; Informix Databases, Netscape, Qualcomm Eudora, Access, MS Word, Excel, FilemakerPro, PowerPoint, and ChemDraw. Online scheduling packages such as Now-Up-To-Date are just being evaluated and tested.

Technical assistance is provided by two service units: (1) The *Microcomputer & Electronics Shop* (3 FTE) is responsible for PC and compatible machine set-ups and initial training, repair, maintenance and upgrades as well as laying cable for LANs and hookups to the LAN/backbone. Services are recharged by a labor hour rate plus materials: extramural user rate of $62/hour and subsidized departmental rates of $56/hour (urgent request) and $46/hour (standard requests). (2) *Computer Services* (2.5 FTE, led by a Ph.D. in Chemistry) provides ongoing consultation, documentation, connectivity, assistance with program crashes, etc. For these services, the faculty members are charged based on their "use" of computers. Most faculty are considered "small" users and charged $650/year while a very few computational chemists pay $1250/year. For specific assistance on new

projects, recharge rates are set at $115/hour for extramural users and the subsidized rate of $75/hour for internal departmental users.

It is important to note that the departmental administration budget is also charged the same rates as are the research contracts and grants for assistance with administrative and instructional computing.

Instructional Computing:

Several courses in the Department are oriented toward teaching students about computing in general and specifically about various applications of computers in Chemistry such as the complete computer-based series of "lectures" (ChemTV=AE) developed for the second year Organic Series. There are both advanced undergraduate and graduate level classes dealing exclusively with Computational Chemistry (Chemistry 125 and 245). The Department maintains the Chemical Calculations with Computers (C3) Laboratory with 26 microcomputers for use by undergraduate students taking any of the Chemistry courses. This laboratory offers software for Molecular Modeling, NMR Data Processing, Technical Document Preparation, etc. A suite of programs on the VAX/VMS cluster was developed to assist with Student Data Entry, Grading, and Enrollment in all lower division undergraduate laboratories.

Research Computing:

A number of research groups within the Department are actively involved in Computational Chemistry. These groups utilize both local computing resources as well as those proved by UCLA Office of Academic Computing (OAC) and NSF Supercomputing Centers. In addition to microcomputers, workstations, and superminis available to some groups, the Department's VAX cluster which consists of six VAX processors supports over 200 faculty and postdoctoral/graduate student users. Most users of the VAX cluster are involved in writing custom applications, accessing networked resources, and communication. Departmental computers control the operation of instrumentation in X-ray Diffraction and Mass Spectrometry Laboratories. Industry-standard RISC workstations are used for consoles for the recent generation of the NMR spectrometers allowing for remote data processing using the X-Window system.

Administrative Computing:

Through the campus backbone, the Department participates in the university supported online administrative systems of Personnel, Finance, Contract and Grant Management, Purchasing, ASAP (post audit transfer of funds), and Student Information Systems.

Internally, the Department has had for many years its own self-written recharge program to charge contracts and grants or faculty for the various departmental shops and sales services. Tapes from this system then are sent to the campus financial system for input. In the last four years, each and every administrative desk has received a Mac Centris or IIsi with Word, Excel, and Eudora as baseline functions. To some degree, this has allowed the Administrative Office internally to automate personnel action changes with the faculty by attaching files through Eudora email connections. This same capability will allow faculty to have monthly updates of grant financial reports. Excel has also given the Department the capability to develop a complete budget system (shadow) combining all operational funds and dispersing them to the various shops and offices for internal management.

Additional technical software assistance is provided by a single administrative staff member for the entire department. The programmer who serves as DSA for the Department to the Central Administrative Systems, also has ongoing responsibility for training Business and Personnel Office staff.

Service Strategies

Lacking specifically identified funding from outside the department for computerization, it is nonetheless the belief of the departmental management that Chemistry and Biochemistry can not maintain its national standing without the very best in computer support. The Department has been considered a leader on the campus in computing for well over a decade when the internal VAX based administrative/research systems were written and because of the early dedication to a user friendly Macintosh environment. Central university administrative systems (which prefer IBM PCs) have been requested and are finding ways to support Chemistry's Macintosh environment [however reluctantly] for the institutionally mandated online systems. As central systems improve over time and some reengineering takes place, there will be less need for the shadow systems currently in place. Internally, the WWW technology can be leveraged to make a greater variety of information related to administrative functions available to all faculty staff and students such as recharge rates and actual use of Chemistry shops and services by individual contracts and grants.

In addition to equipment and accessibility, the ease of computing is of paramount importance--therefore, it is critical to continually employ better software such as Eudora email, new user training materials and to make information more readily available through client-server technology.

Since the recent past has needed to focus on administrative development, it is now the departmental priority to upgrade instructional computing. The C3 Laboratory, for instance, has not been able to upgrade its computers for three years. Additionally better programming off the VAX system and onto the Informix will assist the grading and chemistry experiment results reporting currently in place in the instructional laboratories especially in the First Year Laboratory Courses. Upper Division students using Beckman DU 650 Spectrophotometers would be better served if these were on-line speeding up grading time and providing more time to repeat experiments that have not worked and to achieve quality data. Graphing programs such as Igor need to be programmed to facilitate instruction so that students will be better able to analyze the results of their data. Students have been given their own email accounts, yet, there is a need for continued expansion of this capability. Currently a new project in development called Virtual Office Hours (using WWW) is having a significant impact on the communication capability between faculty and students.

Serving the research effort will continue to be a major strategy focus. Improving services such as migrating research databases and applications off older less reliable and costly systems such as the VAX is needed. The Department must continue to be dedicated to supporting the academic endeavors described by one of our leading research chemist as simply "four things": (1) Number one is manuscript preparation using a variety of software, graphics, and computational programs; (2) Communication (which he says is beginning to push number one) in a world where collaborators may be in places such as Crete and Moscow which have "notoriously unreliable postal service" by having not only instantaneous email, but also exchanging the formatted manuscripts; (3) Teaching, possibly using extensive video animation, and communicating with the students via the recent development of the Virtual Office Hours project; and, (4) Research data acquisition. While this researcher and others like him are completely conversant with the software they are using, they feel absolutely dependent on the high quality of network connections and hardware support the Department provides.

Critical Success Factors and Conclusion

A proactive service orientation, maintenance of creative problem solving units, and strong backing for the computer support staff are absolutely critical to successful systems implementation. The Department can not afford to ignore the computing program and must do whatever is in its power financially to make the systems more available and more easily utilized by its clientele. Recent developmental work was essentially planned and carried out under the direction of the Chair, the CAO and the lead Programmer in consultation with various departmental units and faculty. While such initiatives as those enumerated above are good, there must be a sustained overview of policy and planning conducted by a departmental committee representing an integration of research, instruction and administrative computing interests. At the beginning of the major budget cuts to the Department, a Computer Committee was put in place to review systems from both the administrative and research perspectives; however, this committee enjoyed only about one and a half years of good use except for

some ongoing review of recharges. It is suggested that this committee be reconvened on an ongoing basis with responsibility to strategize on future system implementations which are in the continued best interest of the Department.[2]

GENERAL SUMMARY AND CONCLUSIONS

Common Critical Success Factors

A service orientation: In sometimes very different ways all three organizations have emphasized a customer and service orientation. What is perceived as a service orientation depends very much on the culture and past expectation level of the campus.

Currency of the IT infrastructure: All the institutions have made significant on-going efforts to maintain an up-to-date IT infrastructure which enables faculty and students to have access to networked desktop machines, common software, the Internet, and other IT resources available through the campus or regional networks . It is absolutely clear that such an infrastructure is crucial for the utilization of IT in the classroom.

A prioritization process: Again in very different ways each unit has developed a prioritization process that reflects the culture of the place and allows the most needed services to be given the highest priorities. It is important that not only this occur but also that *perceived* priorities be taken into consideration and dealt with in the user community.

On-going education, training, and support for the individual: Each of the organizations has done this to varying degrees. There is a direct correlation between the level of support for activities of this type and the on-going level of satisfaction demonstrated by the user community.

Change management: As the infrastructure matures, the external environment exerts pressures, and the expectation level evolves, IT management must adjust and realign strategies to meet new and perceived needs if it is to receive good marks from faculty and students. Once more, it is as important to deal with perceptions as it is to react to reality.

Standardization: Each IT unit has initiated a set of standards which enhances ease of use, decreases maintenance efforts, lessons training, and enables the infrastructure to be more easily upgraded. This strategy is one not easily put into place in an academic environment but when established it seems to be valued by almost all.

A steady stream of on-going funding: This is inherent from all of the above. It is not a given in many IT environments. Often allocations are made for one specific thing without regard for other consequences, or cuts in one area are made without regard for the impact elsewhere. If the infrastructure is expanded but support services are not, the result will probably be a perception from the user community that support services have been reduced.

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[2] Gratitude is given to the following individuals from the UCLA Department of Chemistry and Biochemistry: Max Kopelevich, Programmer IV, for the explicit system descriptions herein and to Professors Christopher S. Foote and Kendall N. Houk and Academic Coordinators Marian Dietrich and John Mouser for evaluative remarks.

Conclusion

Goodman, Sproull and associates have said "...that technology is a socially constructed reality. This means that individuals or groups assign meaning to technology, which in turn provides direction for selecting information, retaining information, and making inferences about the relationship between technology and the environment. This socially constructed model is critical in understanding the use of a new technology, changes in processes or outcomes, and subsequent modification of the technology."[3] It is the belief of these authors that the validity of this statement is illustrated by the examples contained in this paper.

Certainly there are physical things that must be done if an institution is to have an IT infrastructure that is well regarded by its faculty and students. However, the physical infrastructure alone will not bring satisfaction to the users of it. Attention must be paid not only to the services offered on how to use the infrastructure but also to the organizational culture and climate in which the infrastructure is utilized. Too often those of us in IT management roles do not pay enough attention to the socially constructed reality of the technology we supply.

10/31/95 (JP)

[3] Paul S. Goodman, Lee S. Sproull and Associates, *Technology and Organizations*. (San Francisco: Jossey-Bass Publishers, 1990) p. 259.

TEAMING UP TO PROMOTE EFFECTIVE TEACHING, LEARNING, AND RESEARCH USING TECHNOLOGY

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ABSTRACT

Teaming Up to Promote Effective Teaching and Learning Using Technology

At the University of Delaware, four units came together to plan a joint summer institute to assist faculty with learning to use information technology. The four units collaborating on this special program, held June 1995, were User Services/Information Technologies, the Library, the Center for Teaching Effectiveness, and the Instructional Technology Center. Each unit has a significant history of offering faculty seminars and workshops which promote new aspects of teaching and learning. These four units worked together to plan and execute the program, which highlighted faculty presenters as well as how-to hands-on workshops taught by computing and library professional staff with guidance from the Center for Teaching Effectiveness. Not only has the University's computing network increased opportunities for faculty and researchers to work together—its presence has created new alliances among University groups who support faculty development in using information technology and resources.

TEAMING UP TO PROMOTE EFFECTIVE TEACHING, LEARNING, AND RESEARCH USING TECHNOLOGY

AUTHORS

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INTRODUCTION

The tall trees and green lawns of the University of Delaware campus provide a garden-like environment for its 20,000 students and 1,000 faculty. As the winter of 1994 ended, the University had just received the CAUSE award for Excellence in Campus Networking. On the campus mall, the roots of the new electronic network beneath the campus were alive and moving data at speeds of 100 million characters per second, the learning environment was ripe for another kind of flowering, and buds prepared to blossom. The Library, 28 microcomputing sites, every classroom, and every Residence Hall room was wired for Internet access. State-of-the-art, technologically advanced lecture halls and classrooms were in place. The early harbingers of this new season were the innovative faculty at the forefront of designing new electronic instructional programs.

How does the University assist all faculty in applying the tools of technology to their garden—that is their classroom—where the real flowering may have the ability to transform education?

The University provided faculty with an innovative, week-long technology institute developed by a team from four University divisions. The process by which this week-long institute evolved and the design of instruction provides a successful model of creative collaboration for faculty and instructional development programs.

Four University divisions, which had not previously collaborated on large instructional projects, worked together successfully to provide a new type of program.

The beauty of what occurred was in its simplicity. That very simplicity makes this project one that can by duplicated by other Universities.

Surveys of colleges and universities across the U.S. report that most faculty are comfortable using computers for word processing, and some use electronic mail to communicate with their students.[1] But, the application of technology to teaching has been slow. For many faculty, technology in the classroom means that word-processed overheads have replaced handwritten overheads. What explains this phenomenon?

William Geoghegan from IBM uses the theories of Moore and Rogers to describe how to understand the different reactions that faculty might have to innovations such as new technologies. He identified adoption behavior along a continuum. Beginning with the innovators and early adopters, he described traditional faculty as the majority/or mainstream faculty, and the nonadopters as the 15% who will never adopt these technologies into their classrooms. He emphasized that the majority need assistance in crossing the chasm to technology adoption.[2]

At the University of Delaware a team representing four University divisions developed a highly successful faculty institute. This week-long faculty institute was designed and implemented within eight weeks. How did four divisions of the University come together as a team to work collaboratively on major faculty development project?

CATALYST FOR CHANGE

The wiring of the campus focused the attention of faculty and administrators who were already actively using electronic resources and technology. The challenge was to develop the interest and skills of all faculty and to encourage greater use of technology in teaching and research.

The Provost initiated a meeting chaired by the Vice Provost for Academic Affairs. The meeting included selected faculty and administrators who were directly involved with either faculty development or technology programming. The two purposes were to address the need for more technology-related educational programs for faculty and to encourage technology use in teaching.

The divisions represented included Information Technologies, the Library, the Instructional

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[1] "Information Technology Moves Slowly into the Classroom," The Technology, Teaching and Scholarship Project, University of Southern California, October, 1994.

[2] Geoghegan, W.H. "Whatever Happened to Instructional Technology? Reaching Mainstream Faculty." International Business Schools Computing Association, Norwalk, CT. July 1994.

Technology Center, and the Center for Teaching Effectiveness. The committee also included faculty who represented both novice and advanced users of technology. Two meetings of this group were held to discuss how best to provide to faculty assistance in using technology in the classroom.

The first outcome of that meeting was a survey of faculty needs designed and conducted by the Center for Teaching Effectiveness. Generally, the survey results served to dispel several myths about what faculty knew, wanted to learn, and pinpointed areas where the four divisions concentrated their efforts.

The second outcome of that meeting was that the administrators from the Library, Information Technologies, Instructional Technology, and the Center for Teaching Effectiveness then joined together in the decision to develop and implement a technology instructional program for faculty. Directors of each of the divisions then asked the appropriate individual in their area to meet and plan the project.

THE SURVEY

With input from the initial committee and the Center for Teaching Effectiveness (CTE) Faculty Advisory Boards, the CTE developed a survey, which was mailed to approximately 950 faculty; one third (315) returned their responses.

The survey responses told us much about faculty learning needs. A summary of those items which may be of general interest to this group includes:

- The majority of faculty respondents use their computers in both office and at home
- The majority of respondents described themselves as intermediate or advanced users
- The 1/6 who described themselves as novice or non-users may have given us the most valuable information

Over half this group wanted to learn the following:

- how others are using technology in their teaching
- how to use a networked environment

Nearly 2/3 wanted to learn the following:

- to use the Internet to retrieve information
- to prepare text and graphics to send on the Internet
- to use video, CD, and audio
- to learn about electronic library resources

Approximately ½ wanted to learn the following:

- use e-mail creatively in instruction

- to communicate with and distribute materials to students
- to use computing applications to conduct research
- to design and conduct courses using TV and video

Although a few wanted basic instruction in software such as word processing and operating systems, one third wanted to learn presentation software and how to use the Ethernet and cable TV connections and capabilities in our classrooms.

Their preferred learning styles vary, and approximately half our respondents said that for their own learning, they prefer hands-on, step-by-step instruction in small groups with practice time and individual assistance. After taking a training class, they most often want individual consultation on a single item and 1/5 need consultation on how to apply what they learned to their own particular instructional projects. One-fourth wanted tip sheets and written reference materials.

When asked what they MOST need NOW in order to use technology in their teaching, responses were scattered, but 40% said they want intermediate and advanced applications to learn new features. Fully 1/3 need help using the skills they already have to design classroom applications, and how to get funding for software, equipment and development time. This is not surprising given the majority of respondents are intermediate or advanced users of technology. The novices asked for the basics on how to begin to use their computers, the ITV classrooms, video and/or satellite facilities, and basic instructional design skills.

Typical comments received were like the following:

"I need to see what others are doing, so I know what is possible and then have time to think about what, if anything, I might want to do."

"What's available and how do I use it?"

"What are my choices?"

"Where to go and who to contact to find out what is available and how to gain access to equipment, software, and classrooms."

Other comments and questions were very specific to particular individuals who asked how to get specific kinds of cable, software, equipment, funding, and so on. When asked whether the person completing the form would be willing to teach other faculty how to use technology, 38 faculty said, "yes", and gave us lists of things they would be willing to teach, ranging from how to use software such as WordPerfect and Windows all the way to multimedia applications.

TEAM PARTNERS IN TECHNOLOGY EDUCATION

Each of the four University divisions involved—Information Technologies, the Library, the Instructional Technology Center, and the Center for Teaching Effectiveness—has significant experience in providing instruction and training. Each division also has a commitment to enhancing education, but with a different focus.

Information Technologies has long been offering classes in computing applications such as word processing, spreadsheets, and statistical programs, and it has been moving aggressively into teaching University faculty, staff, and students to use Internet resources and presentation software.

The Library has always provided instruction for finding information in all forms. This instruction includes classroom teaching, computer assisted instruction, and the electronic library sessions open to the entire University community. Workshops include those to help users find scholarly information on the Internet and the Web for research.

The two other team partners have a slightly different history. The Center for Teaching Effectiveness provides faculty development through instructional consultation. Services include help with how to design, conduct, and evaluate instruction as well as teaching faculty to use effective teaching strategies such as problem-based learning.

The Instructional Technology Center is a self-supporting unit in the College of Education, which relies on grant funding, and assists faculty in developing multimedia courseware, including offering workshops on creating multimedia.

PLANNING PROCESS

The formal planning process for the development of a unified program of instruction for faculty on using technology at the University was surprisingly brief. Much of the actual planning was carried on in the individual divisions. How was this possible? Early on, the division representatives developed a consensus on how to proceed and on what could reasonably be accomplished. The initial meeting of administrators and faculty provided the catalyst, but the implementation was completely the responsibility of the four team members.

Attendance at a symposium on teaching and technology at the University of Maryland gave the team additional ideas for planning. The two hour ride each way provided time for the team to brainstorm and share ideas, and make decisions about what would be best for the Delaware faculty. Each team member then had one or two meetings with appropriate staff in their division responsible for training. Communication among the team members was largely by e-mail. Only one formal planning meeting was held by the team after the trip to Maryland.

TEAM DECISIONS IN INSTRUCTIONAL FRAMEWORK

In one afternoon, the team members had designed the framework for dissemination of information to faculty and decided on an overall instructional design. An important decision that allowed the date to be set only eight weeks later, rather than many months later, was that the majority of workshops were to be those previously developed and successfully held. The consensus was that the majority of faculty had not attended all, or even most, of the workshops already available to them. The concentration of classes into a single week would enable faculty to immerse themselves in learning and, perhaps, make the leap across the "chasm." Even faculty who did not participate in the week long institute, would become more aware of available instruction and might take advantage of repeat presentations later in the semester. Each of the four units selected their own workshops to be offered after consultation with trainers and librarians in each area.

Specific decisions made involved:

Participants: The participants would be limited to University of Delaware faculty and graduate teaching assistants. This would encourage participation and allow sufficient resources and staff support for all interested faculty.

Time: The time was set as a one-week period from June 5-9, 1995, the first week of the summer session. This time was selected because statistics of previous years and the survey indicated that early summer and winter sessions are when faculty say they are most likely to attend workshops.

Content: The second decision was to offer several workshops which had been previously developed and presented in the past year. Workshops were between one to three hours long. Demonstrations of newly wired electronic classrooms would be included in an "open house" mode. These classroom open houses would include descriptions and presentations on how to use the various computing and multimedia equipment available in these large classrooms.

Location: The third decision was that most workshops were to be held in electronic classrooms. The Library, Information Technologies, and the Instructional Technology Center, each has its own instructional classrooms equipped with enough networked workstations to allow each faculty member hands on experience.

Faculty involvement: Faculty from the original Provost sponsored committee reviewed the team's plan and gave it strong endorsement. The fourth decision made was that although it was very desirable to offer a segment during the week that included faculty presenters, the time was limited to secure commitments of many faculty for this first Institute. Some well-known faculty presenters on-campus agreed to make brief presentations on how they used some of the same computing applications. Information Technologies then offered hands-on workshops the same week on compatible topics.

Advertising: The Center for Teaching Effectiveness took responsibility for compiling and organizing the schedule and producing a brochure, which included a detailed schedule of workshops, description of classes, registration form and procedures. Graphically, the brochure was a simple 11" X 17" yellow sheet folded in half, with 10 point type listing all workshops chronologically, followed by a brief description of the content of each.

Registration: Registration was decentralized to each of the four units. Each unit had already established registration procedures and staff and was responsible for handling phone, e-mail and paper registration of faculty signing up for workshops. Registration procedures instructed faculty to contact the presenting division to register, and those staff could then answer questions related to alternative times and the content of the workshop. This process utilized existing systems, staff, and procedures.

Fees: All workshops were at no cost to faculty. Each division assumed the cost of production of materials for its workshops. The Instructional Technology Center, the only one of the four divisions which charges for its multi-media instruction workshops, simply offered their empty seats during that time period to faculty at no charge.

WORKSHOPS AND TECHNOLOGY SESSIONS SCHEDULED

Most workshops selected had already been developed, presented, and favorably evaluated. Some new workshops were developed in response to the needs expressed in the faculty survey. The week long Institute was divided into 33 time slots, based on the length of time required by the presenter, most from one to three hours in length. Information Technologies, with assistance from the Center for Teaching Effectiveness, arranged for three general sessions. These were designed to provide an overview and to include faculty presenters. These included:

"Enhancing the Traditional Classroom with Electronic Communication" in which three faculty members described how they had used e-mail, newsgroups, and the World Wide Web with their students.

"Choosing the Right Tool for Your Class"was a panel of the same faculty discussing the relative advantages and disadvantages of the various tools for particular tasks.

"Using the Classroom of the Future NOW" in which faculty and Information Technologies staff presented brief modules on different classroom applications of technology.

Workshops offered during the remainder of the week focused on those features which faculty could apply to teaching and included:

Information Technologies workshops:
"Getting Started with Pine Mail"
"Getting Started with PowerPoint"
"Using Newsgroups to Extend Classroom Discussion"

"Using E-mail to Extend Classroom Discussion"
"Building a Home Page for your Classroom on the World Wide Web"
"Teaching with Video and Instructional Television"
"Using PowerPoint for Video and Television Instruction"

Library workshops:
"Electronic Access to Journal Information"
"The Web as a Library Resource"
"Current Contents on DELPLUS"
"Electronic Document Delivery using OCLC FirstSearch and CARL UnCover"
"Scholarly Resources on the Internet"
"Government Resources on the Internet"

Instructional Technology Center workshops:
"Creating Multimedia Objects"
"Using PODIUM"
"Multimedia Toolbook"
"Managing Multimedia Development Support"
"Managing Multimedia Delivery"

EVALUATION AND FEEDBACK

Workshop Evaluation and Feedback

Evaluation of the first Institute indicates that faculty expressed overwhelming satisfaction with what they learned (98%). Faculty who attended are excited about what they have been doing this fall semester to use e-mail or newsgroups to extend class discussions, or having students retrieve syllabi and assignments via the World Wide Web, for example.

The Next Step

The next University of Delaware Faculty Institute will be held in January, 1996, and will be called the "Teaching, Learning and Technology, Winter Institute for Faculty and TAs." Some sessions offered last June which were duplicated have been deleted. A call for proposals for the faculty demonstrations was added, there will be two faculty from the University of Maryland providing keynote sessions, and the popular hands-on workshops will be repeated.

For future planning, there are a number of issues to be kept in mind. One of them is the human factor. Although most faculty are accustomed to being seen as experts, when they are novice learners, they experience the same anxiety that any new learner experiences.

For example, one of our faculty members commented that before the workshops, the idea of using technology seemed overwhelming. After the workshops, the main change he reported was: "... the information was available on how to do what I needed and I had an idea of the possibilities. The other significant part was the support I received all along the way from Information Technologies. The support was the most important part." Those who remain sensitive to these factors, while at the same time helping faculty come to grips with being a student again (learning to say "I don't know"), and helping faculty save face in the process, may be more successful in helping faculty to adopt new technologies.

Through the survey, 38 faculty indicated they would be willing to teach other faculty how to use technology, our goal is to create teams of faculty and technical consultants who will co-lead these training sessions. As our faculty become more knowledgeable with these new teaching tools, it is expected there will be more expertise available to offer additional workshops which are focused primarily on the teaching and learning applications instead of learning how to use software.

A variety of options will need to be available to accommodate the various ways faculty learn new skills. Workshops alone will not provide for the full range of learning needs. Already sets of self-paced multimedia development materials (text, CD-ROM, and videotapes) and other self-paced instructional video tapes are available in several locations around campus for faculty to borrow. A Multimedia Users Group (MUG) meets monthly to share their expertise with each other. A number of novices have joined the group to learn more. The feasibility of setting up additional development labs with accompanying teams of instructional and technical consultants to assist faculty in developing educational materials is being explored. The units which planned the Institute will soon meet with other units, such as the Registrar, to determine how best to provide comprehensive "classroom services" for faculty questions related to classrooms and teaching. Because our administration is committed to keep teaching and learning at the center of our technology usage, some believe that the CTE is the appropriate first point of contact. And, since evaluation has always been and continues to be a key to any model employed, continued evaluation and feedback will be used to gather faculty and student data on the services which are initiated.

As useful and important as the pedagogical functions of technology may be, it becomes apparent very quickly that its potential impact might have other dimensions as well. For example, without this project, these four units would not be working together in quite the same way. Nor would we continue to trouble ourselves with this seemingly odd combination of units working together on behalf of the faculty, for the traditional ways of operating are rewarding enough. The challenge becomes even more complex when trying to transform a whole campus rather than just one individual faculty member. It means that each member must be able to see where each contributes, engage in meaningful dialogue, and all of us must continually ask of faculty and of ourselves: "What do you want your students to learn?" "Why?" "What do we know about the students' learning needs?" and so on.

Now, this team is dealing with something that is mostly unknown and constantly changing. The interaction involves the sharing of authority, expertise, and (yes) turf. Future success will depend in large part to the continued recognition that we are dealing not simply with providing technology services to the faculty, but that this effort is always in support of the teaching/learning process. Further, there is a need to understand more fully the dynamics of organizational change as well as the principles of faculty development.

Faculty development research literature suggests three forces that are most likely to drive faculty to change their practices:

- Intrinsic motivation is probably the most powerful. Participation is usually voluntary and we observe in our practice "good teachers who want to get better." Adding the technology tools to the teaching "tool kit" may serve learning better for many students.
- Teaching consultation services are a standard part of faculty development programs in many institutions. Providing additional consultation, which specifically addresses the ways technology can enhance instruction, may lead to better teaching and learning.
- A positive institutional climate for teaching may be the single most influential factor in efforts to improve teaching across an entire campus. A positive climate for use of technology in teaching can also be fostered by providing institutional supports.

Promising practices which offer to bring traditional faculty into this new era are those which appeal to the intrinsic values and beliefs held by faculty, which listen to faculty and help them answer the questions they have about their classroom practices, and which put support systems in place and make sure that faculty have learning partners for their development paths. Most faculty see teaching as their central role, they work hard at their teaching, take pride in it, and believe that the relationship between the student and teacher is central to learning. The reasons for studying most disciplines, such as chemistry, biology, history, literature or a second language have very little to do with technology. If, however, technology can contribute positively to the enhancement of what faculty and students do as they engage with each other in the learning process, and the concerns of faculty can be addressed in some effective way with the use of educational technology, then the mainstream faculty may adopt these new tools.

Finally, the experience at University of Delaware has shown that educational technologies, when supported by a far-sighted administration, has the potential to empower faculty to achieve classroom successes that none of us can anticipate. However, the faculty should continue to determine the curriculum, and the evolution of technology on our campuses should be dictated by the learning needs of students and faculty efforts to meet those needs. Therefore, the impetus should come from the teachers and students themselves, and they (not the technicians) should ask very tough instructional questions of the technology. Together with the technicians and their students, faculty will create the most imaginative uses for educational technology. Furthermore, comprehensive evaluations, particularly the inclusion of student evaluations of educational applications should help assess the pedagogical value of any innovations.

Library and Computing Merger: Clash of Titans or Golden Opportunity

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Abstract:
Many universities are merging knowledge organizations, primarily libraries and computing centers. Discussion typically includes the developing organizational structure, the impact of technology on the organization, and funding implications. One major issue facing these units is the merger of cultures that each brings to the new organization. This cultural merger can either be a clash of titans from which neither emerges intact, or it can be a golden opportunity to incorporate the best of each to produce a different organization with a new cultural value system. This paper describes the merger of a university library and campus computing organization with the best values of each.

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THE ENVIRONMENT

As Arthur P. Young noted in his introduction to the fall, 1994, issue of *CAUSE/EFFECT*, there is "...inexorable trend that is bringing libraries and information technologists into new and challenging forms of interaction."[1] The reasons for this convergence and/or collaboration are many and have been elaborated upon elsewhere.[2,3,4,5] This paper will not discuss the many articles that have been published elsewhere on the rationale for this development.

As more universities have opted for a closer relationship between libraries and computing organizations, much attention has been paid to the issues of organizational structure and control, funding sources and implications, and organizational benefits that can be derived from such a partnership and/or merger.[6,7,8,9,10,11,12] However, relatively few discussions have included any mention of the cultural values that each group bring to the partnership and how those cultural values can either derail the collaboration/merger or enhance it. This is somewhat odd since, in our experience, this question of professional cultural values is one that can totally derail a new merger/partnership if not handled properly. As Diane Cimbala put it in her 1987 article on the scholarly information center, "...The staffs of existing libraries and computing centers may well resist such a change..."[13] Anyone who has ever been involved in an internal merger within an organization wherein the participants share similar academic backgrounds and values knows that, in this best case scenario, mergers are fraught with conflict and unresolved anger. When such a

merger takes place between two different organizations with different professional values, the merger is in peril if a major emphasis is not placed on a merger of the value systems of the two groups involved.

It might be argued that accentuating the differences between the two organizations is not well-placed. Some have stated that, "...the main objective should now focus on exploiting points of convergence to advance campus information and technology agendas."[14] We would disagree about where the emphasis should be placed in the initial stages of merger. In her 1993 paper, "Creating A Virtual Information Organization: Collaborative Relationships Between Libraries and Computer Centers," Sheila Creth stated that "...the relationship between academic librarians and computer professionals has been one characterized by unease, caution, lack of knowledge and understanding, and occasionally outright mistrust."[15] This description of the relationship is accurate in more instances than probably most of us are willing to acknowledge. At a minimum, if there is both a library and a computing organization on campus, and they have a good working relationship, merger of the two organizations leads to a sense of loss for both staffs. What is that loss? Loss of identity with a group who has similar values and experiences perhaps or loss of prestige, power, autonomy or authority.[16]

Are the values of librarians and computing professionals so at odds? What do librarians believe in? What are the values they hold dear? The same questions must be asked of computing professionals.

THE VALUES OF LIBRARIANS

For non-librarians, the answer to the question, "Why do people become librarians?" will be answered with, "Because they like to read." While it is true that most librarians like to read, as I hope all educated individuals do, the real answer to that question is that librarians believe in service. To librarians, libraries are not primarily information or knowledge centers, they are service centers. This is absolutely a core value. The most damning thing you can say about a librarian is that he/she is not service-oriented. Librarians who are poor service providers are typically shunted off to back shop operations which have lower status within the profession and, which, as several research studies show, enjoy lower pay. How this service is delivered to the user depends on the user's status (faculty vs. student), the type of academic library (general vs. specialized branch), the level of funding it enjoys, and the expectations of its clients. This has often been a source of conflict between libraries and faculty who see the library primarily as a storehouse of books and periodicals and who want the money spent on these things; and, librarians who see service as their primary business and books and periodicals as one method for delivering service.

A second value of librarianship is that librarians love to work in groups. Most decisions are group decisions, and the decisions are typically reached by consensus rather than by voting. Academic libraries are a perfect reflection of the academic environment in which they operate because they operate typically by committee. Note we say committee, not task force. These groups may be called teams; TQM has been a big hit in libraries since it emphasizes the development of a team ethic. It is very important that everyone in the group agree on the decision. After a decision is made, an individual who goes off and does his/her own thing will be heartily condemned. It is important to adhere to the group's rules. As Creth has put it, "...librarians...experience a process of acculturation in which they develop a shared philosophy...they are more likely to act within the boundaries of accept professional beliefs and behavior, being less likely to act independently."[17]

The ability to work well together and the desire to provide excellent service to its users has led to cooperation between libraries as institutions that is not typically found in other groups.[18] Librarians have recognized for a long time that no one institution can hope to contain all the information that their clientele will need--so it developed interlibrary loan--and for a long time, that sharing of materials between libraries was without charge to the user. A desire to cooperate for the greater good led to the development of bibliographic utilities which were initially developed so libraries could share cataloging records, thus cataloging materials faster for their users at a cheaper unit cost. A library which refuses to cooperate with its peer institutions whether they are Ivy league, land-grant, or small liberal arts colleges runs the risk of becoming a pariah in its peer group and being deliberately left out of advantageous developments.

Because they have a deeply imbedded value of service and group decision-making, libraries have a very long tradition of user advisory groups. This can be more clearly seen in public libraries where every public library system in the United States has a public library board, sometimes advisory, but often with legislative or regulatory authority. In academia, almost all college and university libraries have library advisory committees populated primarily by faculty, all of whom have a better idea for running the library than the librarians. And, they are seriously listened to! A university library director who ignores his/her library faculty committee does so at the peril of his/her position.

Another value that is strongly held in the profession of academic librarianship is the value of training users to become self-sufficient. Many librarians believe that the primary function of the academic reference desk is to train the user to use the tools of the library, rather than answering the question asked. This, of course, varies depending on the type of question (How many dimples on a golf ball? will usually elicit a direct answer), the status of the questioner (faculty resist being taught anything, especially when they already know how to use the library), and the amount of time to devote to the teaching/learning opportunity (a line of 7 people waiting for the librarian is not conducive to a leisurely explanation of how to use the on-line catalog).

This emphasis has led to the development of bibliographic instruction, which is librarianship's attempt to introduce the library research process into a discipline-based course. For those of you who not librarians, bibliographic instruction is teaching students how to use the library's resources in a particular discipline, such as history, while they are enrolled in a history course which requires library usage. Librarians also teach stand-alone courses that concentrate solely on teaching good library research practices in a general context. However the instruction is delivered, the goal is to make the library self-sufficient for most library needs.

Another distinguishing characteristic of librarians is the tendency to be perfectionists. They are not only service-oriented; they want to deliver perfect service. A complaint from a user will often cause a flurry of self-examination and self-recrimination. For example, in our special collections area which has been rated world-class in its area of specialization, a faculty member may complain that she did not find one book out of 25 she was seeking. The bibliographer will often spend quite some time investigating how we could have missed that one book and try to determine if this one instance is symptomatic of a larger service failure. Librarians will focus in on the glass half empty, rather than half full any day.

The good side of this perfectionist tendency is that librarianship as a profession has been using profession-wide standards for over 100 years. The card catalog looks the same United States-wide because of a decision around the early 1910s at the Library of Congress to institute a "unit" card. Almost every library in the country, with some notable exceptions, followed suit, and thus, almost every library in the country had uniform card catalogs. When librarianship introduced computing into its processing and acquisition activities in the mid-1960s, it was totally natural and in congruence with its professional values to embrace the standardization of electronic bibliographic records. This made possible the development of on-line systems and bibliographic utilities long before most mainstream computing had begun thinking about standards.

Now, of course, like all good things, librarianship has elevated having a standard to that of the false Golden God. Some might argue, to good effect, that standards are impeding the fast delivery of information which is rapidly becoming an expectation of our client base.

A logical extension of the desire for standards (overlaying its desire for perfection) is that developments in librarianship have typically involved a long, slow development path. The way in which librarians catalog information is governed by a standard--called the Anglo-American Cataloging Rules. When it was decided that these rules (familiarly known as AACR) needed to be updated, the new rule formulations which was handled by an oversight committee of the American Library Association, took years to be completed. When AACR2 came out, most librarians were stunned by the radical changes contained it

them; a few librarians were stunned by how conservative the change had been! This is a perfect example of perfectionism, needs for standardization, and a long, slow development path that is characteristic of librarianship.

In reviewing the values of librarianship--orientation to service, group-oriented work, a high value and use of cooperation to reach goals, use of groups to advise development, training/teaching, perfectionism, and standardization--one might say that these are attributes of one particular group and that group is women. Librarianship is still, by and large, a profession of predominately females. This is not a point that is usually made in exploring the merging of libraries and computing organizations, but it must be faced if the merger of the two organizations is to be successful. It is not politically correct to say so in the academic climate of today, but women (and, again, we realize that we are indulging in a generalization that will not hold true for all individuals in the profession) bring a set values to a profession that help set the tone for the profession. This tone has led librarians to being considered extremely trust-worthy, but typically, low paid.

THE VALUES OF COMPUTING PROFESSIONALS

We now have established the value system of librarianship. What values are important to the university computing profession? Please note that we don't really have a "name" for the computing professional. We call the professional staff of the library, librarians, but computing professionals don't really have a moniker. This is significant because it may signify that computing professionals have little in the way of central core educational and experiential backgrounds.[19] They do not share common professional and academic experiences--don't go through a common molding experience that helps to develop a shared professional philosophy. Computing professionals may appear on the scene with a degree in computer science, but they are just as likely to have a degree in telecommunications or engineering or business or physics or philosophy. The end result is that, as computing professionals, we prize individualism and the ability to act independently. While libraries, as we said earlier, tend to act within commonly understood boundaries, computing professionals are much more likely to prize entrepreneurship. If a computing professional disagrees with a currently held view, it just proves he/she is visionary.

Since librarians value the ability to work in groups, its leaders tend to be individuals who can bring people together, or, as Isaiah 1:18 said, "Come now and let us reason together." Computing professionals tend to focus on the charismatic leader: strategic, decisive, visionary, entrepreneurial. One author likened the Chief Information Officer (which is the equivalent of the library director) as Rambo of the Information World.[20] It might even be safe to say that the Rambo CIO has more than an touch of ego in his/her decisions and strategies. Because CIOs tend to be Rambo-like, they move on fairly frequently--once you get past the initial thrill and hype of constant "war," it's hard to build a long-term relationship with an institution unless the CIO segues to a more managerial model--something very hard to do. As a result, compared to librarianship, there are frequent changes of leadership. Coupled with a lack of commonly held academic preparations and experiences, computing organizations tend to be highly volatile and dynamic. This tendency is, of course, exacerbated by the highly evolving nature of technology itself.

Another value of the computing professional is to be oriented to the machine and/or software and not to the end user who uses the box and software. Another way of saying this is to say that computing organizations are very technologically oriented.[21] We think it is fair to say that, while librarians place the emphasis on service to users, computing professionals put the emphasis on service to the technology. This is understandable since technology is not easy to use (from the end-user perspective) and, as the drive to make it easier for the end-user accelerates, it makes the technology even more complex for the computing professional.

Having said this, however, it is hard to imagine being asked in a library meeting, "Just how far do we have to go in helping the user?" We have been asked this question in a computing meeting, and the various responses from computing staff have been vigorously debated and questioned. It is partially, of course, a matter of resources--none of us really has an adequate resource base and the expectations of our clientele are rising. Nevertheless, it has been well-noted by the profession that "...computer people felt

they alone knew best what their clients needed and thus were very non-responsive to the community they should be serving."[22]

One of our computer technicians who follows up on calls to our Help Desk has expressed concern about the arrogance he sometimes sees on the part of the Help Desk staff toward users who call in with problems. Granted, some of these problems are really dumb and the caller should exercise a little more responsibility in running his own technology (like making sure it's plugged in), but this is a problem shared by librarians at a reference desk. It denotes more what one author called the priesthood of computing.[23] Since the early days of computing, there has been a struggle in the profession between those who "...were unalterably opposed to those revolutionaries who wanted to make programming so easy that anyone could do it." [24] This argument sounds strange today, but remnants of the debate linger on in the support often given to the end-user.

The view from the user perspective that computing organizations are typically non-helpful to end users is exacerbated by the fact that three computing staff studying the same problem will have three different solutions to the problem--which each will defend to his/her dying breath. A faculty member from physics recently told us that when he has a computing problem he can't solve, he will ask the electrical engineers, the college computing technician, and our help desk and get three different answers. His plaintive question to us was, "...Who do I believe?" The religious wars of computing are virtually unknown in librarianship.

This conflict over the best methodology or technology to accomplish a goal is linked to another value of computing: the conflict over standardization. As one author put it, "...A primary difference is that libraries are struggling to incorporate the computer within their long tradition of consistency, while computer centers struggle to develop some consistency in a climate of constant change."[25] This is easily understood, of course, because the environment in which information technologists have worked has been, to say the least, volatile. This has made it very difficult for the computing profession to develop and maintain standards. In some instances, there has been very little understanding of the need for adherence to standards once the standard has been established. This is partially driven by the entrepreneurial behavior and creativity often exhibited by the computing professional.

Along with the slow development of standardization has been the desire to get developments out on the street quickly with a higher value being shown for speed of delivery and a lower value shown for quality of product. We have literally never received a software upgrade for our on-line catalog vendor without receiving shortly thereafter a patch tape and, usually, several patch tapes. Those of you who are in computing will not find this an extraordinary observation--this kind of thing drives librarians absolutely wild. Librarians as a group usually will not deliver a service or product until it has been tested, retested, and verified once again. Here, the computing professional is probably closer to what the end user expects--today, in libraries and in computing organizations, the user wants it now, wants it yesterday, wants it before he/she thought of wanting it!

Computing organizations tend to be very aggressive. The experience that Sharon had the first time that she went to a computing meeting after the merger was eye-opening. The group began to argue fiercely about some issue, talking over one another, yelling out their ideas, and generally had a verbal fisticuffs. Finally, to get a word in edgewise, Sharon stood up and yelled, "Everybody shut up and listen, I want to say something." The interesting part of this story is that no one resented her for doing that, and, in fact, she gained a measure of credibility because she was willing to engage in the verbal fistfight.

The language that the two groups uses to essentially describe the same event is reflective of their two cultures. Computing language tends to be aggressive and war-like. Librarians tend to use words which emphasis harmony and group processes. Examples include: computing uses "end-user,"; librarians use "patron." Computing says "execute routine and terminate processes;" libraries "lend and borrow." Computing "hacks a program;" librarian "search for information." Many more illustrations could be made.

The values of individualism, independence, decisiveness, entrepreneurial, aggression, and being oriented to the technology are attributes, in general, of one group and that group is men. Just as librarianship is female-dominated, computing tends to be male-dominated. Again, we acknowledge that there are women who are highly independent, decisive, entrepreneurial, and aggressive, but we maintain that these attributes are generally consider to be, rightly or wrongly, masculine. So while libraries are typically passive-aggressive in the way they operate, it can be said that computing organizations tend to be very aggressive or macho in the way in which they operate.

MERGING THE TWO CULTURES

It should go without saying, but we will say it anyway, that, in order for the two organizations to merger, they must first come to know one another and to appreciate the positive values that each brings to the organization. How do you go about doing this? We do not have the definitive answer, and, in point of fact, will probably never have the definitive answer as organizational development is always in a state of change. Nonetheless, we proffer the following thoughts.

First, name the problem. Four days after the Provost of the university announced the merger of computing and libraries, Sharon held a convocation of both staffs and lined out why she believed this was a positive development for both the library and for the computing organization. She also lined out the problems that she believed needed to be solved before a true merger of cultures could take place. She pointed out that it would not be easy--and it would not be fast. Candor is often rare in higher education--it can be a great tool for building credibility because it is so often underutilized.

We both met with the computing staff and carefully defined our individual managerial styles and how we approached problem-solving and personnel management. It is crucial that the managers, whether it be the director or associate director or the department head, be self-reflective enough to know their own management styles and values and communicate them to the staff. The staff don't have to like or agree with them, but they do need to know what they are. Once we had laid out our values, the staff of both the library and computing tested us to see if we walked what we talked.

Next, you must find ways of bringing the staffs together in ways that are structured to be positive. Every librarian who has ever worked with a computing person can tell you how they promise and don't deliver, how it never works completely right, and how they never show up when they say they will. Every computing person can tell you how demanding librarians are, wanting to know every last little detail and how they insist on every "t" being crossed and every "I" being dotted. So, you have to structure opportunities for them to know one another outside the heat of the battle.

In the library, we have had a library-wide coffee hour on the last day of the month for some time. It is the only time we all actually get a chance to see one another and to visit about our lives and our work and award the Employee of the Month award to the selected individual. Each department takes a turn hosting the event--and bringing the food. Librarians love to cook and, typically, the food at these events is outstanding. The food got computing to come, because they love to eat. When their turn came to host the coffee hour, they were terrified because they knew they couldn't compete. We suggested that they play on their strong suit and provide the stereotypical food associated with computing. So, we had pizza and cokes. The library staff loved it! The computing staff felt accepted, especially when one of the computing staff members was selected as Employee of the Month in the first few months after the merger.

We also decided to upgrade the computing infrastructure of the Library which had been wired over a number of years using whatever standard was in place at the time (if indeed a standard existed at the time). We also decided to redesign the network typology of the library. We called upon the computing staff to carry out the work. They began with more than a touch of arrogance. As our resident networking guru told me, "This will be a piece of cake compared to other things we've done." Well, it wasn't a piece of cake. It was challenging and frustrating and required them to think hard about what we were trying to accomplish. In other words, as they began to directly support the library's daily computing activities, they

began to respect the complexity of the library's need to deliver a high volume of information over a network. And, conversely, as the library's ability to do good work improved with the new wiring standard and the networking topology, the librarians began to appreciate the value that the computing staff could bring to the tasks before us.

The librarians brought their strong service orientation to the merger, and this has directly influenced the development of computing services. We have doubled the number of lines coming into the Help Desk, have increased hours that the calls are taken, and have set benchmarks for service provision. While initially skeptical, after working some time on the Help Desk, most computing staff developed a better orientation to serving the user. For their part, librarians trained the individuals who staff the Help Desk in interview techniques and question negotiation. We don't wish to imply that this problem has been solved and that the new motto of computing is "Service R Us." This is far from the case. But, the question of service to the end user is being debated and discussed. At a minimum, the question of end-user services is now a topic of keen interest on their part, and they are coming to see that their success or failure as an organization rests upon our ability to meet the needs of our users.

Having said this, we believe that computing can influence librarians not to go into a tail spin every time there is a complaint about service. You know the phrase, women who love too much--well, we have librarians who do too much. If we truly believe in self-sufficiency for the user, we have to encourage that self-sufficiency.

Has there been any impact upon librarians from the merger? Yes, and the impact actually has been more problematical than it has been for the computing division. Before the merger, the library has its own computing staff--small in numbers but they were "ours." When the campus computing organization was merged with the library, we merged the library computing staff into the overall division. We think it would be fair to say that most librarians feel a sense of loss over this merger within the merger. It would also be fair to say that this sense of loss comes from a loss of control. Can we really trust those computing guys to support our needs?

The perfectionism of librarianship has caused many to have too high a standard for computing support. Coupled with almost classic passiveness in the face of technology has caused one of our computing staff to say that, "Boy, librarians sure are a whiny bunch." We would have to agree in this instance. Librarians must take more initiative in the face of new technology, because not only must we use it, we must teach it. We hope to inject some of the aggressiveness, entrepreneurialism, and decisiveness exhibited by computing into the library staff. Computing staff typically exhibit a high level of risk-taking--librarians could use a dose of that.

Having said all this, is it hopeless? Are there no similarities between the two groups that can be used as a foundation for building our new culture? Happy to say there are. One of the wonderful characteristics about the computing culture is their insistence on all users having open access to resources; librarians have been a bulwark in the print world against those who would restrict access to information. This is a value under assault in our society; it may indeed take us both working together to maintain open access to digital, print, and other formats in which information comes these days. We are both involved with information at a meta level, neither really cares about the bit level or the transaction level. This calls for a different type of management skill than other groups who work with information. And, finally, we have subgroups within the larger group with similar interests and personality characteristics--computing has programmers and librarians have catalogers.

We hope we have shown what the values of librarians and computing professionals are and how they can complement and clash. The truth is we can dwell on our commonality, or we can emphasize our uniqueness. Today, and even more in the future, "...both computing centers and libraries will be faced with challenges which will tax the fiscal and human capacities of both."[26] We will prosper together, whether it is a merger or a collaborative effort, but we will certainly die separately.

[1] Arthur P. Young, "Information Technology and Libraries: A Virtual Convergence," *CAUSE/EFFECT*, fall, 1994, pp. 5-6, 12.

[2] Richard P. West and Richard N. Katz, "Implementing the Vision: A Framework and Agenda for Investing in Academic Computing," *Educom Review*, winter, 1990, pp. 32-38.

[3] "The Library and the Computing Center: Convergence or Coexistence?" *Online Libraries and Microcomputers*, April, 1991, pp. 1-4.

[4] Patricia Battin, "The Electronic Library--A Vision for the Future,: *EDUCOM Bulletin*, summer, 1984, pp. 12-17, 34.

[5] C. Lee Jones, "Academic Libraries and Computing: A Time of Change," *EDUCOM Bulletin*, spring, 1995, pp. 9-12.

[6] Richard L. Van Horn, "How Significant is Computing for Higher Education?" *EDUCOM Bulletin*, spring, 1995, pp. 6-8.

[7] Raymond K. Neff, "Merging Libraries and Computer Centers: Manifest Destiny or Manifestly Deranged?: an Academic Services Perspective," *EDUCOM Bulletin*, winter, 1985, p. 8-12.

[8] Joy R. Hughes, "Applying change and organizational theories in a library reorganization", *CAUSE/EFFECT*, winter, 1990, pp. 16-22.

[9] Kay Flowers and Andrea Martin, "Enhancing User Services through Collaboration at Rice University," *CAUSE/EFFECT*, fall, 1994, pp. 19-25.

[10]

[11] David C. Weber, "University Libraries and Campus Information Technology Organizations: Who is in Charge Here?" *Journal of Library Administration*, 9(1988), pp. 5-19.

[12] Donald J. Waters, "'We Have a Computer': Administrative Issues in the Relations Between Libraries and Campus Computing Organizations," *Journal of Library Administration*, 13(1990), pp. 117-138.

[13] Diana J. Cimbala, "The Scholarly Information Center: An Organizational Model," *College and Research Libraries*, September, 1987, p. 395.

[14] Arthur P. Young, *op. cit.*, p. 6.

[15] Sheila D. Creth, "Creating a Virtual Information Organization: Collaborative Relationships Between Libraries and Computer Centers," *Journal of Library Administration*, 19(1993), pp. 111-132.

[16] Kristin McDonough, *Prior Consent: Not-So-Strange Bedfellows Plan Library Computing Partnerships*. 1992. unpublished paper. (ERIC ED364225)

[17] Creth, *op. cit.*, p. 120.

[18] Pat Molhot, "Libraries and Campus Information: Redrawing the Boundaries," *Academic Computing*, February 1, 1990, pp. 20-21, 42-43.

[19] Creth, *op. cit.*, p. 120.

[20] Carole A. Barone, "Planning and the Changing Role of the CIO in Higher Education," *Information Management Review*, summer, 1989, pp. 23-31.

[21] Marilyn J. Martin, "Academic Libraries and Computing Centers: Opportunities for Leadership," *Library Administration and Management*, spring, 1992, p. 79.

[22] James M. Rosser and James I. Penrod, "Computing and Libraries: A Partnership Past Due," *CAUSE/EFFECT*, summer, 1990, p.22.

[23] Naomi S. Baron, "Priesthood and Pedagogy: Examining Presuppositions," *EDUCOM Bulletin*, winter, 1985, pp. 13-16.

[24] John Backus, "Programming in America in the 1950s--Some Personal Impressions," in *A History of Computing in the Twentieth Century*, edited by N. Metropolis, J. Howlett, and Gian Carlo Rota. New York: Academic Press, pp. 125-135.

[25] Martin, *op. cit.*, p. 80.

[26] Anne Woodsworth, "Computing Centers and Libraries as Cohorts: Exploiting Mutual Strengths," *Journal of Library Administration*, 19(1988), p. 23.